

WHITE PINE BLISTER RUST CONTROL IN THE

NORTHWESTERN REGION

January 1 to December 31, 1948

United States Department of Agriculture
Bureau of Entomology and Plant Quarantine
Division of Plant Disease Control
Blister Rust Control
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Spokane, Washington

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Herman E. Swanson, Regional Leader

The Bureau of Entomology and Plant Quarantine, U. S. Forest Service, National Park Service, State of Idaho, and the Clearwater, Potlatch, and Priest Lake Timber Protective Associations of North Idaho were directly engaged in ribes eradication work for the control of white pine blister rust in the Northwestern Region in 1948.

The field programs of the three operating agencies were as follows:

	Number Camps	Number Workers
Bureau of Entomology and Plant Quarantine (Cooperative)	9	329
U. S. Forest Service	35	1,258
National Park Service	5	130
Total	49	1,717

Progress in 1948. A total of 52,595 acres was worked in 1948 of which 7,839 acres represent initial work and 44,756 acres rework. This accomplishment was considerably lower than that of 1947 due to the smaller cooperative program on state and private lands, to the somewhat more difficult areas worked in 1948, and to the lack of labor to fill and maintain Forest Service camps at full strength for the season. As a result of 1948 work, 22,900 acres were placed on maintenance and 10,300 acres of previously protected area reverted to an unworked status as a result of logging disturbances.

Labor conditions were not entirely satisfactory. The youthful labor upon which the blister rust control project must depend was very unstable. Uncertainties concerning the draft for military service and the new income tax law as applied to dependents earning \$500 in a year led to considerable labor turnover before the season was completed.

48-Hour Work Week. Although the season was abnormally wet and many days were lost on account of rain, freedom from fire duty and the advantages of a 48-hour work week more than compensated for the loss of time due to bad weather. In 1948, the project was authorized to operate on a 48-hour work week, Monday through Saturday, with time and a half pay for all hours over 40. Workers were guaranteed 40 hours of work per week, but the first 8 hours of the week in which ribes eradication could not be performed on account of weather conditions were scheduled as nonwork time. By coincidence, Saturdays during the summer of 1948 were almost entirely favorable for working, with the result Saturday work constituted 22 per cent of the effective man-days.

An analysis of the nine Bureau camps shows that of the 8,837 effective man-days, Saturday work accounted for 1,226 man-days on straight time and only 706 on

overtime pay while week days accounted for 6,905 man-days on straight time. Under the 40-hour week, Monday through Friday, operative in 1947, in which no overtime was authorized and in which crews were paid for 40 hours rain or shine, all Saturday work would have been out. As compared to 1947 procedure, 1,226 man-days of Saturday work in 1948 were secured without cost. The 706 days of Saturday work at overtime pay also constitute a saving since the average overtime pay runs about \$6 per day under the over-all cost of maintaining a man in the field. This difference represents overhead and fixed costs such as annual and sick leave, camp construction and maintenance, supervision, and lost time due to weather. On the Bureau project, the 48-hour work week effected a direct saving of \$27,500 or 16 per cent as compared to results achieved under the 1947 work week schedule. The 48-hour work week provides other advantages which are not readily measurable but nevertheless real such as attracting better labor and reducing labor turnover. The longer a worker stays on the job the more proficient he becomes.

Chemical Ribes Eradication Methods. Ribes eradication by chemical methods is reducing costs materially on areas where hand grubbing is difficult and methods of application are constantly being improved. For accessible areas where it is practical to broadcast large volumes of low cost solution, power equipment and methods have been developed. For inaccessible areas or where selective treatment with small amounts of concentrated solution is the most practical, a back-pack sprayer (Hi-Fog gun) is available. Equipment most suitable for maneuvers in cut-over areas is being tested which includes tractor-mounted sprayers and trailer-mounted sprayers to be pulled by tractor or truck. New designs of spray nozzles are being made and tested.

A new hormone spray, 2,4,5-T, available only in limited quantities at this time, was given an extensive trial in 1948. Indications are that it will kill all ribes species in this region. If this is true, its use in power spray rigs, portable units, and Hi-Fog guns will replace most hand work in cutover areas. At the present time, 20 per cent of the control area or about 40 per cent of the work load could be handled economically with chemical, leaving areas light in ribes for hand work. When protection of established stands is completed, cutover areas will constitute the main problem and chemical methods should take over almost entirely. On the basis of chemical methods devised up to the present, it appears that costs of a single working should be reduced by 50 per cent. Additional savings may be achieved, since chemical treatment may reduce the number of workings required. The following is a summary of chemical eradication work:

<u>Area</u>	<u>Acres</u>	<u>Man-Days</u>	<u>Gallons</u>
Upland	1,011	931	20,130
Stream type	<u>822</u>	<u>1,806</u>	<u>56,429</u>
Total	1,833	2,737	76,559

One-Man Ribes Eradication Method. This method originally developed in Oregon, was adopted 100 per cent in the Northwestern Region. It is a radical change from former crew methods, in that each man works alone in a lane $2\frac{1}{2}$ chains wide. By means of drag lines, he automatically lays his own guide lines as he works back and forth across the strip. The method fixes individual responsibility for

both the amount of ground covered and the thoroughness of ribes eradication, and poor work is immediately discovered and corrective measures taken. The method resulted in greater output and higher efficiency by eliminating fundamental weaknesses of former crew methods.

Contract Work. Contracting ribes eradication on designated areas was given a trial in the region. Eleven contracts were issued by the Forest Service and the work was completed on approximately 1,000 acres. Three contracts were extended for completion in the spring of 1949. The success of these first contracts is highly encouraging. The work was performed at \$13.50 per acre, including an administrative charge of \$1.20. The total cost is about 75 per cent of what regular work would have required. The simplicity of administration and the extremely clean work which is secured foretell a great expansion in contract work for future blister rust control. As the number of bidders increase, competition will serve to decrease bid prices. Several contracts have already been let for 1949.

Small Camps. Two small camps consisting of 12 to 15 workers, a cook, and a superintendent were operated in 1948. Two other small units were housed with crews doing other forest work. With rework areas becoming smaller and scattered, the small camp appears to have many advantages over the regular 30- and 60-man camps. While experience is not yet conclusive, it appears the close, personal contact between supervisor and worker in the small camp builds better morale and employee relations, and supervision of field work is not handicapped by problems in camp administration. Experience in 1948 showed no labor turnover in the two small camps. The ratio of workers to other camp personnel is about 6 or 5 to 1 in small camps while in the larger camps it is 4 to 1 or even below when the camp strength is not maintained. Small camp installations are less costly and can be more strategically located than the large camps. These advantages all contribute to greater production per worker and lower overhead costs.

White Pine Stocking-Disease Survey. A survey to determine the white pine stocking and the damage from blister rust in reproduction and pole size stands in the Inland Empire was conducted on all forests. Information was also secured on which to base predictions on future white pine losses to blister rust according to number of years elapsing without control being established. About 1,000 miles of strip were run on the survey and the final results showed that the white pine in the original stands had been reduced by a 25 per cent loss from blister rust, leaving an average of 15,750 board feet of white pine per acre. On areas where control had been established, the future yield has been estimated at 5 billion board feet. On areas partially protected, an additional 7 billion board feet depend upon completion of ribes eradication to prevent further losses. Each year that control work is delayed approximately 3 per cent of the stand is becoming fatally infected. Infection occurring through 1937 is responsible for a large part of the damage to be suffered in pole size timber, although considerable new damaging infection occurred in 1941 where ribes were present. The amount of damaging infection in pole parallels that in reproduction under similar conditions.

The survey was made on lands of all ownerships, but of the 60 men engaged in the work at different times during the season, the majority was on National Forest lands.

Economic Blister Rust Control Study. The Region 1 study on white pine management under the handicap of blister rust conducted by Messrs. Donald N. Matthews and S. Blair Hutchison of the Northern Rocky Mountain Forest and Range Experiment Station was completed. Their report, soon to be published, is an outstanding contribution in white pine management and in the economics of growing white pine. It provides a sound procedure for planning programs and selecting units on which blister rust control and the growing of white pine are to be conducted.

SUMMARY OF PROGRESS

A summary of blister rust control activities in the Northwestern Region is presented in the following tables:

TABLE 1

SUMMARY OF RIBES ERADICATION BY STATES AND OPERATING AGENCIES - 1948

State	Operating Agency	First Working			Second Working			Other Workings			All Workings			Per Acre		Number of Camps	Total Seasonal Employees
		Acres	Ribes Destroyed	Man-Days	Acres	Ribes Destroyed	Man-Days	Acres	Ribes Destroyed	Man-Days	Acres	Ribes Destroyed	Man-Days	Ribes	Man-Days		
Idaho	BEPQ	2,876	373,998	2,712	5,337	289,426	3,542	3,733	163,553	2,583	11,946	826,977	8,837	69	.74	9	329
	FS	2,522	546,792	3,431	18,909	753,920	15,551	8,664	164,712	7,495	30,095	1,465,424	26,477	49	.88	28	1,000
	Subtotal	5,398	920,790	6,143	24,246	1,043,346	19,093	12,397	328,265	10,078	42,041	2,292,401	35,314	55	.84	37	1,329
Montana	FS	520	230,717	1,882	2,755	272,456	3,511				3,275	503,173	5,393	154	1.65	5	200
	NPS	391	56,855	928	580	29,287	391	1,314	18,011	763	2,285	104,153	2,082	46	.91	2	40
	Subtotal	911	287,572	2,810	3,335	301,743	3,902	1,314	18,011	763	5,560	607,326	7,475	109	1.34	7	240
Washington	FS	1,032	164,559	709	807	138,944	996	124	9,098	89	1,963	312,601	1,794	159	.91	2	58
	NPS	9	8,470	18				1,055	100,130	1,162	1,064	108,600	1,180	102	1.11	2	50
	Subtotal	1,041	173,029	727	807	138,944	996	1,179	109,228	1,251	3,027	421,201	2,974	139	.98	4	108
Wyoming	NPS	489	85,000	795	1,326	68,746	496	152	18,954	204	1,967	172,700	1,495	88	.76	1	40
All States	BEPQ	2,876	373,998	2,712	5,337	289,426	3,542	3,733	163,553	2,583	11,946	826,977	8,837	69	.74	9	329
	FS	4,074	942,068	6,022	22,471	1,165,320	20,058	8,788	173,810	7,584	35,333	2,281,198	33,664	65	.95	35	1,258
	NPS	889	150,325	1,741	1,906	98,033	887	2,521	137,095	2,129	5,316	385,453	4,757	72	.89	5	130
Total		7,839	1,466,391	10,475	29,714	1,552,779	24,487	15,042	474,458	12,296	52,595	3,493,628	47,258	66	.90	49	1,717

TABLE 2

ACREAGE WORKED BY LAND OWNERSHIP - 1948

Land Ownership	First Working Acres	Second Working Acres	Other Workings Acres	All Workings Acres
National Forest Region 1	4,085	19,842	7,522	31,449
National Park	889	1,906	2,521	5,316
Public Domain		80	341	421
State and Private	2,865	7,886	4,658	15,409
Total	7,839	29,714	15,042	52,595

TABLE 3

SUMMARY OF EXPENDITURES - FEDERAL AND COOPERATIVE - 1948

State	Federal Funds					Cooperative Funds			Total All Funds	Expenditures Ribes Eradication
	Entomology and Plant Quarantine		Forest Service	Park Service	Total Federal Funds	Direct Aid	Indirect Aid	Total (Direct and Indirect Aid)		
	71.14	73.14								
Idaho	\$ 94,800	\$99,339	\$769,212		\$ 963,351	\$35,979	\$2,000	\$37,979	\$1,001,330	\$ 889,173
Mont.	17,500		133,418	\$26,464	177,382		1,000	1,000	178,382	154,882
Wash.	17,000		66,340	26,233	109,573		1,000	1,000	110,573	79,573
Colo.	750				750		200	200	950	
Wyo.	5,000			25,554	30,554		200	200	30,754	25,554
Total	\$135,050	\$99,339	\$968,970	\$78,251	\$1,281,610	\$35,979	\$4,400	\$40,379	\$1,321,989	\$1,149,182

TABLE A

STATUS OF RIBES ERADICATION BY STATES - ALL OWNERSHIPS, DECEMBER 31, 1948
Accumulative Series - Net

State	Total Acres		First Working		Second Working	Other Workings	On Maintenance		Remaining Work	
	White Pine	Control Area (Wh.P.& Prot.Zone)	Acres	Per Cent	Acres	Acres	Acres	Per Cent	Unworked Acres	Requiring Rework Acres
Idaho	1,881,507	2,254,664	1,509,008	67	434,654	133,173	495,129	22	745,656	1,013,879
Montana	204,683	213,053	142,658	67	19,146	8,038	78,230	37	70,395	64,428
Washington	140,706	152,973	117,299	77	45,296	24,667	37,974	25	35,674	79,325
Subtotal	2,226,896	2,620,690	1,768,965	68	499,096	165,878	611,333	23	851,725	1,157,632
Wyoming*	231,000	231,000	29,140	13	1,478	152	13,635	6	201,860	15,505
Colorado*	205,000	205,000	14,859	7	1,962		8,000	4	190,141	6,859
Subtotal*	436,000	436,000	43,999	10	3,440	152	21,635	5	392,001	22,364
Total	2,662,896	3,056,690	1,812,964	59	502,536	166,030	632,968	20	1,243,726	1,179,996

TABLE B

SUMMARY OF STATUS OF RIBES ERADICATION BY LAND OWNERSHIP, DECEMBER 31, 1948
Accumulative Series - Net

Land Ownership	Total Acres		First Working		Second Working	Other Workings	On Maintenance		Remaining Work	
	White Pine	Control Area (Wh.P.& Prot.Zone)	Acres	Per Cent	Acres	Acres	Acres	Per Cent	Unworked Acres	Requiring Rework Acres
National Forests R-1	1,195,209	1,404,712	1,064,963	76	295,424	83,282	349,469	25	339,749	715,494
National Forests R-2 & 4	421,000	421,000	36,619	9	1,962		17,000	4	384,381	19,619
Subtotal	1,616,209	1,825,712	1,101,582	60	297,386	83,282	366,469	20	724,130	735,113
National Parks	23,590	23,590	15,740	67	8,487	12,221	10,285	44	7,850	5,455
Public Domain	21,289	30,039	16,727	56	6,235	2,701	6,634	22	13,312	10,093
Subtotal - Interior	44,879	53,629	32,467	61	14,722	14,922	16,919	32	21,162	15,548
Total - Federal	1,661,088	1,879,341	1,134,049	60	312,108	98,204	383,388	20	745,292	750,661
State and Private Lands	1,001,808	1,177,349	678,915	58	190,428	67,826	249,580	21	498,434	429,335
Total	2,662,896	3,056,690	1,812,964	59	502,536	166,030	632,968	20	1,243,726	1,179,996

*Indefinite

COOPERATIVE BLISTER RUST CONTROL ON STATE AND PRIVATE LANDS

Calendar Year 1948

Cooperative blister rust control on state and private lands in the Northwestern Region was confined to the State of Idaho, where the Bureau of Entomology and Plant Quarantine, in cooperation with the State of Idaho and the Clearwater, Potlatch, and Priest Lake Timber Protective Associations, administered the program. In Montana and Washington, state and private lands are small and scattered. Some of these lands were worked by the Forest Service incidentally to the protection of national forest lands.

The small control program, resulting from the reductions in federal allotments for fiscal years 1948 and 1949, reached only a small part of the state and private lands requiring early attention to prevent heavy losses to young white pine stands. Disease surveys show an average loss from blister rust of 25 per cent in white pine stocking in stands up to 75 years old with new damaging infection occurring at the rate of 3 to 6 per cent of the stand per year where control has not been established. Control work, under the small program, is being directed to complete protection in the better pole and reproduction stands in units of sufficient size to prevent damage from the outside.

Work in the Clearwater territory is largely on cutover lands within several excellent white pine areas. This work is serving to protect the new crop of white pine on the cutover area as well as adjacent older reproduction or pole size white pine. In the Potlatch and Priest Lake districts, work priorities are in older reproduction and pole stands. On the St. Joe and Kaniksu operations, comprising a larger territory than the above districts, 7,000 acres of state and private land received the final working necessary to establish control.

The camps and workers on the cooperative field program were as follows:

Operation	Number Camps	Number Workers
Clearwater	3	89
St. Joe (Potlatch)	3	140
Kaniksu (Priest Lake)	<u>3</u>	<u>100</u>
Total	9	329

A description of the cooperative work will be found in the Clearwater, St. Joe, and Kaniksu reports. A summary of the 1948 cooperative program follows:

1. Allotments

	<u>Fiscal Year 1948</u>	<u>Fiscal Year 1949*</u>
Federal	\$125,000.00	\$125,000.00
State of Idaho	20,000.00	20,000.00
Clearwater T.P.A.	6,502.78	6,531.28
Potlatch T.P.A.	5,396.16	5,381.86
Priest Lake T.P.A.	<u>4,055.00</u>	<u>4,055.00</u>
Total	\$160,953.94	\$160,968.14

*Approximate

2. Expenditures - Calendar Year 1948

<u>Operation</u>	<u>State and Private</u>	<u>Federal</u>	<u>Total</u>
Clearwater	\$14,850.32	\$26,912.53	\$ 41,762.85
St. Joe (Potlatch)	13,466.49	35,238.38	48,704.87
Kaniksu (Priest Lake)	<u>7,662.13</u>	<u>37,188.09</u>	<u>44,850.22</u>
Total	\$35,978.94	\$99,339.00	\$135,317.94

1948 - State of Idaho \$20,025.00, T.P.A. \$15,953.94

1928-1948 - State of Idaho 243,495.78, T.P.A. 199,206.33

3. Cooperative Ribes Eradication in Idaho, 1948

<u>Operation</u>	<u>Acres Worked</u>			<u>Man-Days</u>	<u>Ribes</u>	<u>Per Acre</u>	
	<u>Initial</u>	<u>Rework</u>	<u>Total</u>			<u>Man-Days</u>	<u>Ribes</u>
Clearwater	1,723	485	2,208	2,598	318,188	1.18	144
Potlatch	165	5,067	5,232	3,384	252,689	.65	48
Kaniksu	<u>988</u>	<u>3,518</u>	<u>4,506</u>	<u>2,855</u>	<u>256,100</u>	<u>.63</u>	<u>57</u>
Total	2,876	9,070	11,946	8,837	826,977	.74	69

4. State and Private Lands Worked in 1948

<u>State</u>	<u>Acres Worked</u>			
	<u>First</u>	<u>Second</u>	<u>Third</u>	<u>Total</u>
Idaho	2,853	7,729	4,612	15,194
Montana	12	13	-	25
Washington	<u>-</u>	<u>144</u>	<u>46</u>	<u>190</u>
Total	2,865	7,886	4,658	15,409

5. Progress on State and Private Land, 1923-1948 (Net Acres)

<u>State</u>	<u>Acres Worked</u>			<u>Acres on Maintenance</u>	<u>Acres Unworked</u>	<u>Total Acres in Control Area</u>
	<u>First</u>	<u>Second</u>	<u>Third</u>			
Idaho	635,749	175,952	60,975	223,884	478,423	1,114,172
Montana	19,744	2,604	2,014	11,875	15,013	34,757
Washington	<u>23,422</u>	<u>11,872</u>	<u>4,837</u>	<u>13,821</u>	<u>4,998</u>	<u>28,420</u>
Total	678,915	190,428	67,826	249,580	498,434	1,177,349

BLISTER RUST CONTROL ON NATIONAL FORESTS IN REGION ONE

Calendar Year 1948

Blister rust control in 1948 on National Forest lands was administered by the Forest Service with the Bureau of Entomology and Plant Quarantine assisting in the technical direction of the work.

The two-year study on the economics of blister rust control and on a white pine management policy for Region One was completed by D. N. Matthews and S. Blair Hutchison at the close of the year. In line with the recommendations of this study, each national forest is analyzing its white pine areas on the basis of subdivisions known as working units. This analysis considers blister rust control and management costs in relation to white pine yield, and provides a basis for selecting units on which white pine will be grown and protected. A white pine stocking-disease survey was conducted on each forest to secure information necessary for the analysis.

Forest Service ribes eradication operations employed to advantage the new developments in chemical eradication methods. In stream type, 2,4-D and Ammate were applied with Hi-Fog guns and power spray rigs. A new hormone spray, 2,4,5-T, found to be effective on upland ribes, was available in limited quantities. Work on cutover areas was speeded up with power sprayers using 2,4,5-T. The use of this chemical in Hi-Fog guns reduced costs considerably on heavy ribes concentrations in less accessible areas. The Bureau of Entomology and Plant Quarantine transferred seven power sprayers mounted on $1\frac{1}{2}$ -T trucks to the Forest Service for use in blister rust control.

Contracting of ribes eradication on National Forest lands was tried with success. Very clean work was secured under contract specifications at a lower cost than regular work. As the number of responsible contractors increases, it is expected that competition in bidding will further reduce costs. Most of this work was done on the Kaniksu National Forest and is described in the Kaniksu report.

Expenditures and accomplishments in blister rust control by the U. S. Forest Service are summarized in the following tables:

1. Expenditures by Forest Service, 1948

Clearwater	\$166,371.40
St. Joe	284,831.53
Coeur d'Alene	200,069.60
Kaniksu	184,279.44
Cabinet	52,472.00
Kootenai	80,946.27
Total	\$968,970.24

2. Expenditures by Forest Service, 1930-1948

<u>Forest</u>	<u>Regular</u>	<u>Emergency</u>	<u>Total</u>
Clearwater	\$1,337,972.95	\$ 413,454.80	\$1,751,427.75
St. Joe	2,567,935.19	383,340.06	2,951,275.25
Coeur d'Alene	1,474,834.35	669,809.81	2,144,644.16
Kaniksu	1,471,578.94	458,055.36	1,929,634.30
Cabinet	557,909.26	258,476.52	816,385.78
Kootenai	<u>374,782.22</u>	<u>28,233.00</u>	<u>403,015.22</u>
Total	\$7,785,012.91	\$2,211,369.55	\$9,996,382.46

3. Ribes Eradication by Forest Service Crews, 1948

<u>Forest</u>	<u>Acres Worked</u>			<u>Man-Days</u>	<u>Ribes</u>	<u>Per Acre</u>	
	<u>Initial</u>	<u>Rework</u>	<u>Total</u>			<u>Man-Days</u>	<u>Ribes</u>
Clearwater	793	5,723	6,516	5,535	640,520	.85	98
St. Joe	473	13,395	13,868	10,880	307,744	.78	22
Coeur d'Alene	1,092	4,303	5,395	6,922	308,456	1.28	57
Kaniksu	1,196	5,083	6,279	4,934	521,305	.79	83
Cabinet	326	891	1,217	2,708	210,533	2.23	173
Kootenai	<u>194</u>	<u>1,864</u>	<u>2,058</u>	<u>2,685</u>	<u>292,640</u>	<u>1.30</u>	<u>142</u>
Total	4,074	31,259	35,333	33,664	2,281,198	.95	65

4. Ribes Eradication on National Forest Lands, 1923-1948

<u>Forest</u>	<u>Net Acres Worked</u>			<u>Acres on Maintenance</u>	<u>Acres Unworked</u>	<u>Total Acres</u>
	<u>First</u>	<u>Second</u>	<u>Third</u>			
Clearwater	151,294	56,778	11,894	37,463	49,058	200,352
St. Joe	215,755	91,614	35,335	74,971	97,946	313,701
Coeur d'Alene	309,071	55,736	16,067	86,996	51,975	361,046
Kaniksu	270,739	78,226	16,331	88,280	85,618	356,357
Cabinet	63,377	8,990	3,500	30,169	75,867	74,026
Kootenai	<u>54,727</u>	<u>4,080</u>	<u>155</u>	<u>31,590</u>	<u>44,503</u>	<u>99,230</u>
Total	1,064,963	295,424	83,282	349,469	339,749	1,404,712

BLISTER RUST CONTROL ON NATIONAL PARKS

Calendar Year 1948

Blister rust control in the National Parks in the Northwestern Region is described in separate reports for Mount Rainier, Glacier, and Yellowstone. A separate report of the tests with 2,4-D and 2,4,5-T in Rocky Mountain is also given. The following statement presents the highlights of the program.

While adverse weather handicapped the work in 1948, satisfactory progress was made. Chemicals facilitated the work a great deal. Ammate and 2,4-D were used to advantage to destroy large ribes plants and heavy ribes concentrations in stream type. A new hormone spray, 2,4,5-T, available only in limited quantities in 1948, was very effective in Mount Rainier. The chemical appears to be quite selective and current checks indicate a complete kill of masses of ribes underneath an overstory of alder and willow without injury to the latter bushes.

No significant changes in the spread of blister rust in the National Parks were observed in 1948. The disease surveys in Glacier showed considerable pine infection outside the control areas compared to the small amount where ribes eradication had been conducted. It appears that ribes eradication is being completed with little time to spare. Even though ribes infection has been found in Yellowstone for several years, no pine infection has been found.

The end of large scale ribes eradication work is in sight. In Mount Rainier, the 1949 work is virtually a maintenance project and future work requirements will be for maintenance only. In Glacier, large scale work should be completed in 1949, with the exception of a small rework job on Oldman Lake in 1953. Plans for 1950 through 1952 call for a maintenance crew of seven men. In Yellowstone, estimates provide for the completion of initial eradication and rework by 1950. Maintenance requirements are estimated to be a 7-man crew for the years 1951 through 1954. While no work has been done in Rocky Mountain, it is planned to start work in 1950 and to complete rework in 1953.

Expenditures and progress. Expenditures and accomplishment in blister rust control by the National Park Service are presented in the following summaries:

1. Expenditures by National Park Service

<u>National Park</u>	<u>Calendar Year 1948</u>	<u>All Years</u>
Mount Rainier	\$26,233.56	\$122,782.98
Glacier	26,463.78	101,030.74
Yellowstone	25,553.89	103,353.99
Rocky Mountain		741.56
Total	\$78,251.23	\$327,909.27

2. Ribes Eradication in 1948

<u>National Park</u>	<u>Acres Worked</u>				<u>Man-Days</u>	<u>Ribes</u>	<u>Per Acre</u>	
	<u>First</u>	<u>Second</u>	<u>Other</u>	<u>Total</u>			<u>Man-Days</u>	<u>Ribes</u>
Mount Rainier	9		1,055	1,064	1,180	108,600	1.11	102
Glacier	391	580	1,314	2,285	2,082	104,153	.91	46
Yellowstone	489	1,326	152	1,967	1,495	172,700	.76	88
Total	889	1,906	2,521	5,316	4,757	385,453	.89	72

3. Gross Acreage Worked, 1930-1948

<u>National Park</u>	<u>Acres Worked</u>				<u>Man-Days</u>	<u>Ribes</u>	<u>Per Acre</u>	
	<u>First</u>	<u>Second</u>	<u>Other</u>	<u>Total</u>			<u>Man-Days</u>	<u>Ribes</u>
Mount Rainier	8,263	4,327	9,920	22,510	24,036	2,379,355	1.07	106
Glacier	4,770	3,469	2,369	10,608	11,075	1,077,739	1.04	102
Yellowstone	7,380	1,478	152	9,010	6,427	745,586	.71	83
Total	20,413	9,274	12,441	42,128	41,538	4,202,680	1.00	100

4. Work Status in Net Control Area

<u>National Park</u>	<u>Acres Worked</u>			<u>Acres on Maintenance</u>	<u>Acres Unworked</u>	<u>Total Acres* Control Area</u>
	<u>First</u>	<u>Second</u>	<u>Other</u>			
Mount Rainier	3,590	3,540	9,700	3,000		3,590
Glacier	4,770	3,469	2,369	2,650	230	5,000
Yellowstone	7,380	1,478	152	4,635	1,620	9,000
Rocky Mountain					6,000	6,000
Total	15,740	8,487	12,221	10,285	7,850	23,590

*Final acreage to be determined. Control area boundaries, with a few minor exceptions, have been established. Exact acreages within these boundaries have been difficult to determine because of steep topography and lack of satisfactory base maps. Minor adjustments may have to be made in 1949 in setting the final acreages for Mount Rainier, Glacier, and Yellowstone.

BLISTER RUST CONTROL, INLAND EMPIRE, 1948

By

Frank O. Walters

Assistant Regional Leader

Introduction

The work methods and procedures used in the Inland Empire this season marked wide departures from previously employed methods, and increased efficiency and production. Principal contributing factors were:

1. The contracting of hand eradication work.
2. The one-man drag line method.
(Both of the above were developed on the Oregon operation.)
3. The adoption of the 48-hour week.
4. An expanded use of chemical and improved equipment for its application.

Contract Work

The Kaniksu operation pioneered the way in adapting the contract work to this region and further exploring its possibilities. Top supervisory personnel were responsible for creating wide-spread interest. As a result, a number of bidders competed for Forest Service contracts, and those receiving them were generally successful in their execution. As word of this success spread, greater competition developed resulting in a general lowering in bid prices. The Kaniksu report shows that during the current season the bid prices ranged from \$8.50 to \$22 per acre. The over-all cost to the Government, including administrative expense, was \$13.44 per acre, which was well below the cost of regular Forest Service work on this operation. The contract terms are rigid and demand a highly efficient job. Originally applied only to areas of light ribes populations, it now appears that all areas may be worked under the contract system. The Government is confronted with many fixed and overhead costs. Contractors can avoid such costs and effect other savings not possible in Government operations; hence, the application of the contract system has far-reaching potentialities.

One-Man Drag Line Method

In laying out the work for this method, parallel lines are laid $2\frac{1}{2}$ chains apart to form a lane across the area to be worked. The lanes are marked at 5-chain intervals, thus dividing the area into $1\frac{1}{4}$ -acre lots. Each man works independently in a lane, using two drag lines to delimit narrow areas of search at right angles to the parallel lines. Eradication data are recorded by $1\frac{1}{4}$ -acre lots. A check is run the length of the lane, with the checker's course alternating from one side of the lane to the other so that all parts of the lane are inspected. Careful attention is also given to ribes sites occurring off the check strip. More accurate information is thus secured on the condition of the ground after working. The occasional piece of poor work that has proven so damaging in the past is now detected, and needed rework performed. Checking information is also recorded by $1\frac{1}{4}$ -acre lots; thus a valuable record of information on small units of area is secured, which, taken collectively, forms a pattern of extreme value in building unit work plans. Since each individual

is accountable for the amount and quality of work produced, the inevitable competition develops greater individual effort. This is attested by the high quality work secured where the method was applied. Inefficiencies are quickly detected and corrective measures taken.

The 48-Hour Work Week

The adoption of the 48-hour work week brought about substantial savings and increased production. Under this arrangement, 40 hours a week were guaranteed. The first 8 hours lost because of rain during the regular work week was re-scheduled for Saturday at straight time. When 40 hours had been worked during the week, overtime rates were paid for Saturday work. The resulting gain in effective man-days was the important factor in reducing costs and producing additional work. In the case of the Bureau of Entomology and Plant Quarantine, the 48-hour week was in effect from June through September. As a result, 1,226 man-days were regained that otherwise would have been lost because of weather conditions. Overtime was paid for 706 days. An additional 1,933 man-days were secured under the 1948 work schedule over what would have been possible under the 1947 schedule of a 40-hour week. As a result, a savings of \$3.11 per effective man-day was accomplished. It is essential that all effective man-days possible be secured during the short season to amortize the overhead and camp establishment costs.

Chemical

The effectiveness of the hormone chemical 2,4,5-T permitted more extensive application of chemical methods in difficult upland and stream type areas. Large truck-mounted power units were used on all operations to spray ribes concentrations with either 2,4,5-T or Ammate. The Clearwater operation used a trailer-type power unit of their own design, and one developed by J. F. Breakey of the Bureau of Entomology and Plant Quarantine to good advantage in killing ribes on roadsides and skid roads in cutover areas at a very low cost. By eliminating these bushes, which represented most of the ribes on the area, hand crews can now perform an economical eradication job on the balance of the area. Continuous efforts are being made to develop suitable nozzles and work out procedures in handling and locating hose lines to speed up the work.

Hi-Fog guns were used extensively by the Clearwater operation to mop up Ribes petiolare in the stream type and also by the Kaniksu operation to treat a very troublesome ribes concentration at the head of Kalispell Creek at a cost far below anything possible with hand work.

Training

Control work is becoming dependent on individual effort, and training objectives are directed toward the development of the individual. Training charts were used on all operations to indoctrinate new workers in the objectives and methods of the work and to serve as refresher courses for experienced men. Best results are secured by constant follow-up training of the individual by the camp supervisor. The achievement of this end was the principal objective in preseason supervisor training schools and in the counseling of camp supervisors by the operations⁹ men.

Work Areas and Accomplishments

Because of the shortage of funds, all operations continued the policy of working only a limited number of units of highest priority and exerting every effort to place all possible lands in these units on a maintenance basis. Many difficult areas which were proving a hazard to adjacent excellent white pine stands were worked.

The Bureau camps on the Kaniksu completed the work as planned for the Pack River drainage. A high per cent of the drainage is now on maintenance and only small amounts of work will be needed in the future. In the Happy Fork of Big Creek, necessary rework in cutover type was brought up to date.

The Forest Service worked the stream type on Granite Creek to protect bordering pole timber and plantations. Stream type and cutover lands in Goose Creek and the upper West Branch were worked to protect adjacent pole and advance reproduction. Work in the pole stands along the Thorofare and Upper Priest Lake progressed satisfactorily and only a small amount of work remains to place this large block of pine on maintenance.

On the St. Joe operation, the Bureau crews worked a large block of white pine pole to maintenance standards in the Syringa Creek portion of the Thorn Creek unit and successfully treated a large spot burn with chemical to protect adjacent white pine. Necessary rework was brought up to date on Cougar Creek in the west fork of Potlatch Creek. Work as planned for the Long Meadow Creek unit was completed, most of it being placed on maintenance.

The Forest Service operations were aimed primarily at securing maintenance conditions on several extensive blocks of advance reproduction and pole timber in Emerald, Charlie, Upper Santa, Ramskull, Strychnine Creeks, the east fork of Meadow Creek, and the west fork of St. Maries River. A total of 13,868 acres was covered. Work areas still remain in the east fork of Meadow, Santa, and Ramskull Creeks. Work plans call for completing these areas in 1949.

Work on state and private lands on the Clearwater operation has been largely confined to several large blocks of excellent young white pine growth which have developed since cutting. Work was performed in the vicinity of Pierce, Idaho, on lands cut over since 1940 and near Headquarters, Idaho, in stands established following logging from 1928 to 1935. One area of extremely heavy ribs on Summit Peak which presented a hazard to adjacent pine was sprayed with chemical from power units.

Clearwater Forest Service operations combined hand and chemical methods to treat recent cutover lands in the Musselshell and Sheep Mountain areas. Expanded chemical programs are planned for these areas next season. Advance reproduction and pole stands in the Moose Creek basin and upper Tamarack were given a second working. Rework was performed in the Alder Creek plantation and the pole adjacent to the Beaver Creek plantation was worked to extend the plantation protection zone.

Kootenai Forest Service crews reworked the Star Creek plantation and completed

power spray work on the heavy stream type on Yaak River near Sylvanite Ranger Station. The excellent reproduction stands in the south fork of Callahan Creek were reworked and the protection zone was extended up the drainage to reduce the hazard from adjacent ribes concentrations.

On the Cabinet Forest, work was carried on in the difficult, brushy areas at the headwaters of Marten and Trout Creeks. Initial work in these drainages will be completed in 1949. These heavy ribes concentrations represent a threat to the plantations and natural stands in the lower reaches of the drainages. Power spraying on the St. Regis drainage was continued at Sildex and at the mouth of Rainy Creek. This work will be completed in 1949.

Coeur d'Alene Forest Service crews worked pole stands in Teepee, Cabin, Hudlow Creeks, and on Colt Mountain, most of which was placed on maintenance.

Plantations in Honey and Independence Creeks, Drexal Springs, and West Elk were reworked. A large block of older plantation in the Jordan Creek area was placed on maintenance. Reproduction and cutover areas were given added protection in Cataract, Independence, Steamboat, Burnt Cabin, Shoshone Creeks, and at the mouth of Copper Creek.

Accomplishments per man-day were again greater than prewar levels with 1.11 acres being worked per man-day, but down from last year when 1.37 acres were worked per man-day. More work in difficult areas accounted for the difference, with an average of 66 ribes per acre being removed in 1948 as compared with 39 ribes per acre in 1947.

Disease Survey

At the request of the Forest Service, Richard T. Bingham of the Bureau of Entomology and Plant Quarantine developed a survey method to be run on an extensive basis and to yield reliable stocking and disease data on a drainage basis. He also conducted a school to train workers in the survey procedures. Surveys were undertaken on all operations, primarily in the pole type, to provide essential information for the working unit analyses. Over 1,000 miles of strip were run in the region. The work of the field parties was coordinated by Bingham so that standards set up for securing and recording data would be maintained throughout the region. He also served as technical advisor, ironing out difficulties arising in connection with the work. Late in the season, this work was turned over to F. J. Heinrich of the Bureau of Entomology and Plant Quarantine. Most of the surveys were conducted on National Forest lands by Forest Service personnel. When time permitted, Bureau personnel took an active part in the surveys throughout the season, and after the close of the active field season were able to make surveys on state and private lands. The high per cent of infection found in many pole stands indicates the price paid for being unable to keep abreast of necessary work. Many class I areas were reduced to class II, due to the inroads of the disease. On most areas where control work had not been initiated, the amount of loss due to rust was found to be so great that control was no longer an economic venture.

The methods of analyzing the data on a unit basis, as worked out by Donald N. Matthews of the Forest Service, provide an excellent means of determining the value of an individual unit as well as its comparative rating against other units on an operation and in the region.

STATEMENT OF EXPENDITURES AND COSTS

The statement of expenditures and costs is shown in the following tables by the cooperative agency and the type of appropriation.

TABLE 1

EXPENDITURES BY APPROPRIATIONS IN INLAND EMPIRE, 1948

Cooperating Agency	Appropriation	Amount
Bureau of Entomology & Plant Quarantine	Regular BLR-1-4	\$ 61,694.96
	Regular BLR-3-4	99,339.00
	Subtotal	\$ 161,033.96
State of Idaho Timber Protective Associations	State BLR-3-4	\$ 20,025.00
	Private BLR-3-4	15,953.94
	Subtotal	\$ 35,978.94
Forest Service	Regular BLR-4	\$ 968,970.24
Total		\$1,165,983.14

TABLE 2

CLASSIFIED EXPENDITURES IN INLAND EMPIRE, 1948

Item	Bureau of Entomology and Plant Quarantine				Forest Service	Total
	Regular BLR-1-4	Regular BLR-3-4	State and Private BLR-3-4	Total	Regular BLR-4	
Cont. ribes erad.					\$ 10,945.50	\$ 10,945.50
Sal. perm. men	\$42,621.52	\$ 7,606.60		\$50,228.12	138,562.88	188,791.00
Sal. temp. men	695.59	20,535.17	\$ 6,635.97	27,866.73	92,569.29	120,436.02
Wages, temp. labs.	2,447.40	61,333.75	29,342.97	93,124.12	409,946.21	503,070.33
Subs. supplies	3,649.39	5,370.45		9,019.84	194,454.79	203,474.63
Equipment		113.04		113.04	18,972.40	19,085.44
Trucks					4,304.54	4,304.54
Travel and transp.	3,869.33	2,884.94		6,754.27	22,959.88	29,714.15
Other supplies	8,411.73	1,495.05		9,906.78	76,254.75	86,161.53
Total	\$61,694.96	\$99,339.00	\$35,978.94	\$197,012.90	\$968,970.24	\$1,165,983.14

TABLE 3
SUMMARY OF RIBES ERADICATION, 1948
INLAND EMPIRE

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
First	Plantation	1945-49	253	175	23,466	.69	93
	Cutover	1945-49	413	396	71,294	.96	173
	Cutover (4)	1940-44	3,597	4,183	779,073	1.16	217
	Cutover	1920-39	522	613	72,595	1.17	139
	Reproduction(5)	1910-39	1,668	2,616	176,290	1.57	106
	Pole		203	107	6,255	.53	31
	Mature		137	112	19,066	.82	139
	Stream (1)		157	532	168,027	3.39	1,070
	Total		6,950	8,734	1,316,066	1.26	189
Second	Plantation	1945-49	679	787	120,325	1.16	177
	Cutover	1940-44	451	800	149,393	1.77	331
	Cutover	1920-39	1,366	632	78,935	1.46	58
	Reproduction(6)	1910-39	7,456	9,691	526,580	1.30	71
	Pole (7)		15,262	7,638	257,958	.50	17
	Mature (8)		796	612	33,710	.77	42
	Miscellaneous		109	687	31,602	6.30	290
	Stream (2)		1,689	2,753	256,243	1.63	152
	Total		27,808	23,600	1,454,746	.85	52
Third	Plantation	1940-44	441	470	13,742	1.07	31
	Cutover	1940-44	146	85	709	.58	5
	Cutover	1920-39	1,900	1,861	129,813	.98	68
	Reproduction(9)	1910-39	4,335	3,702	78,714	.85	18
	Pole (10)		4,330	2,939	52,732	.68	12
	Mature		170	105	7,286	.62	43
	Miscellaneous		49	5	4	.10	1
	Stream (3)		1,150	1,000	54,363	.87	47
	Total		12,521	10,167	337,363	.81	27
GRAND TOTAL			47,279	42,501	3,108,175	.90	66

Chemical work included above:

Stream				Upland			
		Gallons				Gallons	
Acres	Man-Days	Spray		Acres	Man-Days	Spray	
(1) 111	451	30,023		(4) 621	552	18,117	
(2) 254	680	20,532		(5) 241	187	1,031	
(3) 82	192	504		(6) 31	83	147	
				(7) 57	46	29	
				(8) 5	5	750	
				(9) 5	3	5	
				(10) 51	55	51	

TABLE 4
SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1948
INLAND EMPIRE

State	Working	Class	Acres	Man-Days	Ribes	Gallons Spray	Per Acre	
							Man-Days	Ribes
Idaho	First	EQ-Coop.	2,876	2,712	373,998	3,000	.94	130
		FS-Reg.	2,522	3,431	546,792	28,069	1.36	217
		Total	5,398	6,143	920,790	31,069	1.14	171
	Second	EQ-Coop.	5,337	3,542	289,426	150	.66	54
		FS-Reg.	18,579	15,348	750,036	9,509	.83	40
		FS-Cont.	330	203	3,884		.62	12
		Total	24,246	19,093	1,043,346	9,659	.79	43
	Third	EQ-Coop.	3,733	2,583	163,553	69	.69	44
		FS-Reg.	8,164	7,242	160,887	435	.89	20
		FS-Cont.	500	253	3,825		.51	8
		Total	12,397	10,078	328,265	504	.81	26
	All Workings	EQ-Coop.	11,946	8,837	826,977	3,219	.74	69
		FS-Reg.	29,265	26,021	1,457,715	38,013	.89	50
		FS-Cont.	830	456	7,709		.55	9
		Total	42,041	35,314	2,292,401	41,232	.84	55
Montana	First	FS-Reg.	520	1,982	230,717	11,270	3.62	444
	Second	FS-Reg.	2,755	3,511	272,456	11,760	1.27	99
	All Workings	FS-Reg.	3,275	5,393	503,173	23,030	1.65	154
	First	FS-Reg.	1,032	709	164,559	6,832	.69	159
Washington	Second	FS-Reg.	807	996	138,944	39	1.23	172
	Third	FS-Reg.	124	89	9,098	56	.72	73
	All Workings	FS-Reg.	1,953	1,794	312,601	6,927	.91	159
	First	EQ-Coop.	2,876	2,712	373,998	3,000	.94	130
		FS-Reg.	4,074	6,022	942,068	46,171	1.48	231
		Total	6,950	8,734	1,316,066	49,171	1.26	189
Total	Second	EQ-Coop.	5,337	3,542	289,426	150	.66	54
		FS-Reg.	22,141	19,855	1,161,436	21,308	.90	52
		FS-Cont.	330	203	3,884		.62	12
		Total	27,808	23,600	1,454,746	21,458	.85	52
	Third	EQ-Coop.	3,733	2,583	163,553	69	.69	44
		FS-Reg.	8,288	7,331	169,985	491	.88	21
		FS-Cont.	500	253	3,825		.51	8
		Total	12,521	10,167	337,363	560	.81	27
	All Workings	EQ-Coop.	11,946	8,837	826,977	3,219	.74	69
		FS-Reg.	34,503	33,208	2,273,489	67,970	.96	66
		FS-Cont.	830	456	7,709		.55	9
		Total	47,279	42,501	3,108,175	71,189	.90	66

TABLE 5
OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1948
INLAND EMPIRE

State	Working	Acres Worked																
		By Forest Service					By Bureau of Entomology and Plant Quarantine					Total						
		National Forest	Public Domain	State	Private	Total	National Forest	Public Domain	State	Private	Total	National Forest	Public Domain	Total	State	Private	Total	Total
Idaho	First	1,978		44	500	2,522	567		395	1,914	2,876	2,545		2,545	439	2,414	2,853	5,398
	Second	15,755		922	2,232	18,909	682	80	1,754	2,821	5,337	16,437	80	16,517	2,676	5,053	7,729	24,246
	Third	6,946	330	485	903	8,664	498	11	1,264	1,960	3,733	7,444	341	7,785	1,749	2,863	4,612	12,397
	Total	24,679	330	1,451	3,635	30,095	1,747	91	3,413	6,695	11,946	26,426	421	26,847	4,864	10,330	15,194	42,041
Montana	First	508			12	520						508		508		12	12	520
	Second	2,742			13	2,755						2,742		2,742		13	13	2,755
	Total	3,250			25	3,275						3,250		3,250		25	25	3,275
Washington	First	1,032				1,032						1,032		1,032				1,032
	Second	663			144	807						663		663		144	144	807
	Third	78			46	124						78		78		46	46	124
	Total	1,773			190	1,963						1,773		1,773		190	190	1,963
Total	First	3,518		44	512	4,074	567		395	1,914	2,876	4,085		4,085	439	2,426	2,865	6,950
	Second	19,160		922	2,399	22,471	682	80	1,754	2,821	5,337	19,842	80	19,922	2,676	5,210	7,886	27,808
	Third	7,024	330	485	949	8,788	498	11	1,264	1,960	3,733	7,522	341	7,863	1,749	2,909	4,658	12,521
	Total	29,702	330	1,451	3,850	35,333	1,747	91	3,413	6,695	11,946	31,449	421	31,870	4,864	10,545	15,409	47,279

TABLE 6
RIBES SPECIES ERADICATED, 1948
INLAND EMPIRE

Working	Eradication Type	Acres	Ribes Species						Total Ribes
			Ribes lacustre	Ribes viscosissimum	Ribes petiolare	Ribes inerme	Ribes coloradense	Ribes triste	
First	Plantation (1945-49)	253	23,459		7				23,466
	Cutover (1945-49)	413	38,202		32,407		685		71,294
	Cutover (1940-44)	3,597	219,006	553,862	5,971	234			779,073
	Cutover (1920-39)	522	66,316	5,770		509			72,595
	Reproduction (1910-39)	1,668	82,401	86,918		21	6,950		176,290
	Pole	203	4,307	1,939		9			6,255
	Mature	137	18,905	70			91		19,066
	Stream	157	54,106	48	17,600	93,800	2,473		168,027
	Total	6,950	506,702	681,021	23,571	95,258	9,514		1,316,066
	Plantation (1945-49)	679	8,257	112,068					120,325
Second	Cutover (1940-44)	451	5,410	143,801		182			149,393
	Cutover (1920-39)	1,366	50,260	28,027	20	628			78,935
	Reproduction (1910-39)	7,456	254,322	271,953	13	154	138		526,580
	Pole	15,262	141,852	115,511	17	578			257,958
	Mature	796	22,815	10,895					33,710
	Miscellaneous	109	1,080	30,522					31,602
	Stream	1,689	152,888	1,826	22,647	28,777	5	50,100	256,243
	Total	27,808	636,884	714,603	22,697	30,319	143	50,100	1,454,746
	Plantation (1940-44)	441	9,537	4,205					13,742
	Cutover (1940-44)	146	565	144					709
Third	Cutover (1920-39)	1,900	83,934	45,589	290				129,813
	Reproduction (1910-39)	4,335	55,986	20,152	187	2,389			78,714
	Pole	4,330	29,888	22,198	626	20			52,732
	Mature	170	6,817	469					7,286
	Miscellaneous	49	1		3				4
	Stream	1,150	34,919	3,118	15,318	1,008			54,363
	Total	12,521	221,647	95,875	16,424	3,417			337,363
	Plantation (1945-49)	932	31,716	112,075					143,791
	Cutover (1945-49)	413	38,202	32,407		685			71,294
	Plantation (1940-44)	441	9,537	4,205					13,742
All Workings	Cutover (1940-44)	4,194	224,981	697,807	5,971	416			929,175
	Cutover (1920-39)	3,788	200,510	79,386	310	1,137			281,343
	Reproduction (1910-39)	13,459	392,709	379,023	200	2,564	7,088		781,584
	Pole	19,795	176,047	139,648	643	607			316,945
	Mature	1,103	49,537	11,434			91		60,062
	Miscellaneous	158	1,081	30,522	3				31,606
	Stream	2,996	241,913	4,992	55,565	123,585	2,478	50,100	478,633
	Total	47,279	1,365,233	1,491,499	62,692	128,994	9,657	50,100	3,108,175

TABLE 7

SUMMARY OF RIBES ERADICATION, 1923-1948
INLAND EMPIRE

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Burn	1945-49	243	548	111,750	2.26	460	243	
	Plantation	1945-49	1,443	1,208	68,380	.84	47	1,443	473
	Cutover	1945-49	1,156	1,069	158,113	.92	137	1,156	26,611
	Burn	1940-44	926	535	100,985	.58	109	926	
	Plantation	1940-44	5,892	8,232	2,183,197	1.40	371	5,892	227
	Cutover (4)	1940-44	15,081	17,400	6,111,360	1.15	405	15,081	112,401
	Cutover	1920-39	86,133	84,051	24,850,783	.98	289	81,736	241,183
	Reproduction (5)	1910-39	606,077	681,762	183,191,377	1.12	302	594,912	161,289
	Pole		373,337	160,160	28,446,167	.43	76	368,352	84,998
	Mature		708,744	298,965	63,297,246	.42	89	532,284	190,948
	Miscellaneous		36,909	32,485	8,409,040	.88	228	34,204	9,700
	Stream (1)		125,356	315,671	65,052,241	2.52	519	124,376	23,665
	Total		1,961,297	1,602,086	381,980,639	.82	195	1,760,605	851,495
Second	Plantation	1945-49	732	942	138,736	1.29	190	732	
	Plantation	1940-44	4,507	4,365	254,463	.97	56	4,507	
	Cutover	1940-44	1,323	1,618	214,471	1.22	162	1,323	
	Cutover	1920-39	57,022	62,641	13,279,635	1.10	233	57,022	
	Reproduction (6)	1910-39	204,293	244,662	22,911,576	1.20	112	202,576	
	Pole (7)		119,466	63,889	5,136,785	.53	43	118,739	
	Mature (8)		44,420	28,379	3,008,316	.64	68	40,450	
	Miscellaneous		4,876	6,132	918,064	1.26	188	4,876	
	Stream (2)		62,253	96,150	12,669,364	1.54	204	61,862	
	Total		498,892	508,778	58,531,410	1.02	117	492,087	
Third	Plantation	1940-44	3,465	2,843	97,557	.82	28	3,465	
	Cutover	1940-44	146	85	709	.58	5	146	
	Cutover	1920-39	33,725	34,493	2,118,654	1.02	63	33,725	
	Reproduction (9)	1910-39	69,643	93,108	3,604,119	1.34	52	69,054	
	Pole (10)		21,353	13,429	554,273	.63	26	21,353	
	Mature		3,591	2,673	284,283	.74	79	3,591	
	Miscellaneous		1,115	571	32,156	.51	29	1,115	
	Stream (3)		21,378	30,856	2,709,507	1.44	127	21,360	
	Total		154,416	178,058	9,401,258	1.15	61	153,809	
GRAND TOTAL			2,614,605	2,288,922	449,913,307	.88	172	2,406,501	

Chemical work included above:

Stream				Upland			
		Gallons				Gallons	
Acres	Man-Days	Spray		Acres	Man-Days	Spray	
(1)	23,579	56,011	1,568,862	(4)	682	654	32,817
(2)	9,867	14,550	272,967	(5)	241	187	1,031
(3)	4,380	5,618	59,496	(6)	31	83	147
				(7)	57	46	29
				(8)	5	5	750
				(9)	5	3	5
				(10)	51	55	51

TABLE 8

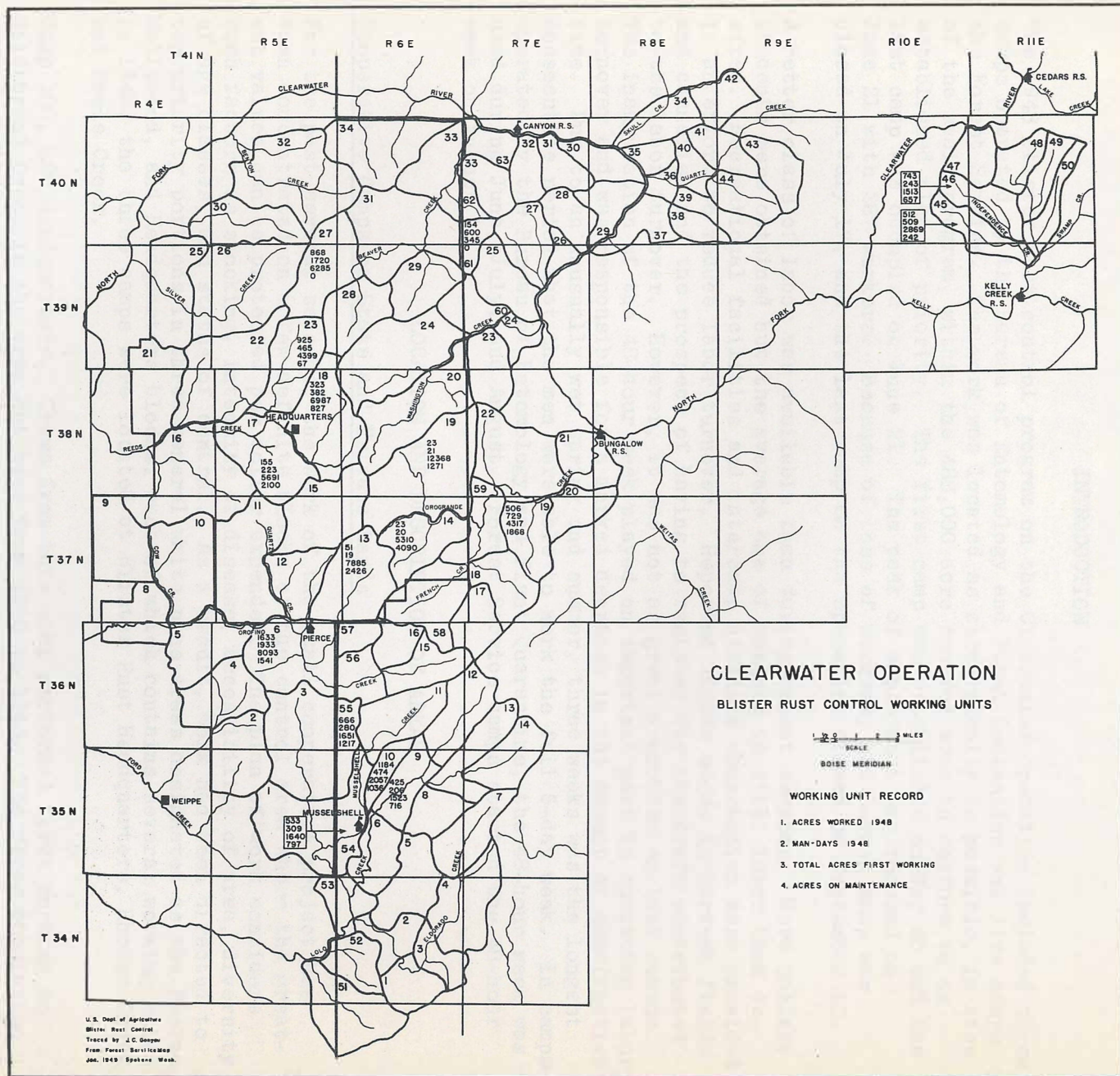
SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1923-1948
INLAND EMPIRE

State	Class	Gross Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
						Man-Days	Ribes
Idaho	EQ-Reg.	48,984	20,468	5,042,300	79,864	.42	103
	EQ-Coop.	281,883	171,732	24,926,080	226,142	.61	88
	EQ-Emerg.	514,942	404,100	96,874,569	213,935	.78	188
	FS-Reg.	489,382	521,598	85,602,931	512,201	1.07	175
	FS-Emerg.	337,869	216,240	56,636,775	125,491	.64	168
	CCC	590,414	661,693	123,729,240	657,303	1.12	210
	FS-Cont.	911	534	14,819		.59	16
	Total	2,264,385	1,996,365	392,826,714	1,814,936	.88	173
Montana	EQ-Reg.	2,002	3,295	761,710	34,795	1.65	380
	EQ-Emerg.	66,076	30,787	5,775,415	1,330	.47	87
	FS-Reg.	45,197	57,009	5,081,967	48,329	1.26	112
	FS-Emerg.	35,712	35,620	7,367,723	21,638	1.00	206
	CCC	14,475	12,440	1,472,009	6,325	.86	102
	Total	163,462	139,151	20,458,824	112,417	.85	125
Washington	EQ-Emerg.	64,757	63,140	17,825,782		.98	275
	FS-Reg.	63,307	51,175	11,301,494	8,802	.81	179
	FS-Emerg.	36,366	14,386	4,013,260		.40	110
	CCC	22,328	24,705	3,487,233		1.11	156
	Total	186,758	153,406	36,627,769	8,802	.82	196
Total	EQ-Reg.	50,986	23,763	5,804,010	114,659	.47	114
	EQ-Coop.	281,883	171,732	24,926,080	226,142	.61	88
	EQ-Emerg.	645,775	498,027	120,475,766	215,265	.77	187
	FS-Reg.	597,886	629,782	101,986,392	569,332	1.05	171
	FS-Emerg.	409,947	266,246	68,017,758	147,129	.65	166
	CCC	627,217	698,838	128,688,482	663,628	1.11	205
	FS-Cont.	911	534	14,819		.59	16
	Total	2,614,605	2,288,922	449,913,307	1,936,155	.88	172

TABLE 9

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1923-1948
INLAND EMPIRE

State	Ownership	Net Acres in Control Area					
		Acres Worked				Acres Unworked	Total Acres
		First	Second	Third	Total		
Idaho	National Forest	856,887	252,530	69,497	1,178,914	253,921	1,110,808
	Public Domain	16,372	6,172	2,701	25,245	13,312	29,684
	Subtotal Federal	873,259	258,702	72,198	1,204,159	267,233	1,140,492
	State	228,254	65,731	21,890	315,875	120,173	348,427
	Private	407,495	110,221	39,085	556,801	358,250	765,745
	Subtotal Other	635,749	175,952	60,975	872,676	478,423	1,114,172
	Total	1,509,008	434,654	133,173	2,076,835	745,656	2,254,664
Montana	National Forest	118,104	13,070	3,655	134,829	55,152	173,256
	Public Domain	40	3		43		40
	Subtotal Federal	118,144	13,073	3,655	134,872	55,152	173,296
	State	734	1		735	173	907
	Private	19,010	2,603	2,014	23,627	14,840	33,850
	Subtotal Other	19,744	2,604	2,014	24,362	15,013	34,757
	Total	137,888	15,677	5,669	159,234	70,165	208,053
Washington	National Forest	89,972	29,824	10,130	129,926	30,676	120,648
	Public Domain	315	60		375		315
	Subtotal Federal	90,287	29,884	10,130	130,301	30,676	120,963
	State	6,832	4,015	2,114	12,961	988	7,820
	Private	16,590	7,857	2,723	27,170	4,010	20,600
	Subtotal Other	23,422	11,872	4,837	40,131	4,998	28,420
	Total	113,709	41,756	14,967	170,432	35,674	149,383
Total	National Forest	1,064,963	295,424	83,282	1,443,669	339,749	1,404,712
	Public Domain	16,727	6,235	2,701	25,663	13,312	30,039
	Subtotal Federal	1,081,690	301,659	85,983	1,469,332	353,061	1,434,751
	State	235,820	69,747	24,004	329,571	121,234	357,154
	Private	443,095	120,681	43,822	607,598	377,100	820,195
	Subtotal Other	678,915	190,428	67,826	937,169	498,434	1,177,349
	Total	1,760,605	492,087	153,809	2,406,501	851,495	2,612,100



BLISTER RUST CONTROL, CLEARWATER OPERATION, 1948

By

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H. J. Faulkner, Assistant Operation Supervisor

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INTRODUCTION

The 1948 blister rust control program on the Clearwater operation included three camps operated by the Bureau of Entomology and Plant Quarantine and five camps by the Forest Service. The work was located as strategically as possible, in view of the small program, within the 488,000 acre control area to conform to an established plan of priority. The first camp was established on May 25 and the last camp was occupied on June 21. The peak of employment was reached on June 21 with 287 workers. Because of loss of workers, one Bureau camp was closed on July 17, and the last camp on the operation closed on September 10.

A better class of labor was available than during recent seasons. More college students were obtained but the average age of workers is still lower than desired. Recreational facilities and intercamp athletic competition were provided in an effort to reduce labor turnover. Reported higher wages in harvest fields and canneries and the prospect of having to register for the draft contributed to the labor turnover. However, it was not as great a problem as last season. The inauguration of the 48-hour week played an important part in combating labor turnover and was responsible for a marked decrease in the amount of noneffective time. Due to an unusually wet spring and summer, three weeks was the longest consecutive period that the men were able to work the full 6-day week. In camps operated by the Bureau of Entomology and Plant Quarantine, the 48-hour week was used during June, July, and August. Forest Service camps started the 48-hour week on August 1.

LOCATION AND DESCRIPTION OF AREAS

Cooperative Camps on State and Private Lands

For the past several seasons, the work of the small cooperative project has been concentrated on a few definite blocks of the control area where the greatest values can be protected per dollar expended. The plan of work considers such factors as stocking, intensity of disease, accessibility of area, diversity of age classes, and status of control. As a result, work had been directed to top priority portions in three general white pine areas designated as the Pierce, Hollywood, and Headquarters blocks, each of which contains several working units. In 1948, the three camps were located at Blister Rust Headquarters, Rhodes Creek, and Reeds Creek.

Camp 100, BRC Headquarters. Crews from this camp performed first working on Hildebrand Creek in the area cut over from 1940 to 1943. The ribes population varied considerably, ranging from heavy along some side streams and small upland spots to sizable areas with very light concentrations. *Ribes viscosissimum* was the predominating species although some upland *R. petiolare* were encountered. Approximately 85 ribes per acre were removed. The check showed the work to be of better quality than normally secured for first working on such areas. Working

conditions were difficult because of recent activities of cedar makers. Stream type on Hildebrand Creek and all tributaries in the cutover area were sprayed by Hi-Fog guns applying 2,4-D chemical to R. petiolare. The 18 acres were examined prior to treatment to locate the bushes and avoid spraying the entire stream type.

This area is an important part of the Pierce block and lies adjacent to ground worked last season on Flat Creek and Orofino Creek. Since the seed source is barely adequate, it was necessary to protect the young white pine which came in immediately following logging by eradicating the ribes as soon as they were large enough to be located by the crews. This ground will need at least two more workings before it becomes stabilized, although it is not anticipated that the ribes population will be heavy at any time.

Camp 130, Rhodes Creek, was occupied during two previous seasons. It is centrally situated for transporting crews to a considerable area of excellent white pine. In 1948, first working was done on 1940-44 cutover on all of Mutton Gulch and second working on 50 acres east of the Mutton Gulch-Orofino Creek divide. Ribes, principally R. viscosissimum, were generally distributed but were considerably lighter on the west side. Approximately 65 ribes per acre were removed on first working and 80 per acre on second working. A few upland R. petiolare were removed, mostly from the west side of the area. Working conditions were generally good. The 35 acres of stream type in the drainage were scouted for R. petiolare and bushes were sprayed with 2,4-D using Hi-Fog guns. Where chemical experiments were performed last season and the original bushes had not been killed, detection of the late sprouting crowns was very difficult. On one 60-acre piece, this was not realized until after working. Since other vegetation was so dense, it was decided to leave the area until early next year for spraying with 2,4,5-T. One small area had large numbers of very small R. lacustre hidden in other vegetation and this was sprayed with 2,4,5-T.

All necessary current work was completed in a block extending from Flat Creek east to the edge of cutover ground. This is a part of the Pierce block supporting good white pine reproduction which came in immediately following logging. The pine was seriously threatened by the ribes present, as evidenced by the heavy infection in small, scattered, and somewhat older trees. Although the drainage was severely cut, there remains in most places an adequate seed source. Since other ground cover is rapidly taking over the seed bed, it is advisable to protect the present young stand. This area will undoubtedly need a second working and approximately one-half may need a third working. Judging from the present pattern, ribes will be generally distributed but of comparatively light concentration for this type of area on the Clearwater.

Camp 131, Reeds Creek. Four separate areas were worked in the Headquarters block. A 1940-44 cutting of 120 acres on Fohl Creek was initially worked to provide a protection zone for the excellent white pine reproduction along Reeds Creek. It served as a training area for new workers. Unusually large R. viscosissimum, averaging 575 per acre, were removed. Windfalls and unburned slash piles made working difficult. The final check was satisfactory for this class of area.

Near the junction of Reeds Creek and Deer Creek, second and third working was performed on ground cut over during 1930-39. This area supports a fine stand of white pine reproduction which was established after selective logging. Working conditions were very good, and excellent progress was made by the crews. There were approximately 80 ribes per acre with R. viscosissimum predominating. The last working left ribes seedlings too small to be seen at the time. Removal of these now mature bushes will prevent seeding and a new crop of ribes when the residual stand is removed. Most of this area will now go into the maintenance category until further disturbance occurs.

On the north fork of Reeds Creek, third working was performed on ground extending north for about one mile from the highway to the town of Headquarters. This area was cut over from 1920-39 and contained about 30 ribes per acre, generally distributed. Working conditions were rather severe because of much high brush. There is a good crop of white pine reproduction here although at least one crop has been lost to blister rust. An adequate seed source remains but there is now so much competition from brush that it is doubtful if another crop would be established if the present one were lost. This area will now largely meet maintenance standards.

In a 1940-45 cutting near Summit Lookout, 35 acres of heavy R. viscosissimum were treated with 1,850 gallons of 2,4,5-T. The work served as an experiment in handling power equipment and hose lines in upland types. The area supports no white pine but the many ribes present were a constant source of infection to the reproduction directly below.

Future work to be done on ground covered by this camp involves another working on Fohl Creek in about three years, and one more working in four years on a piece of ground in Deer Creek and the north fork of Reeds Creek which failed to meet maintenance standards.

Other work done by crews from cooperative camps not directly related to areas described above consisted of chemical spraying in St. Louis Gulch, Canal Gulch, and Orogrande Creek. A three-man crew, using a power sprayer, applied 2,4,5-T to 21 acres of logging roadsides. This was initial working on an area cut over in 1940-44. The ribes treated constituted a high percentage of those present in the area and the remaining ground will be worked by hand eradication methods next season. The same crew and equipment were used in spraying 51 acres with 2,4,5-T along logging roads in Canal Gulch where cutting was done in 1940-44. R. viscosissimum were heavy along the many roads and the spray work treated a high percentage of the ribes on the entire area. The remaining portion will be worked next season by hand eradication crews. This cutting is in the midst of an excellent pole stand in the Pierce block and the ribes were a definite hazard to this stand as well as to the white pine reproduction in the logged area. On Orogrande Creek Hi-Fog guns with 2,4-D were used on 46 acres of stream type. This work removed the highly dangerous R. petiolare bushes which constituted a threat to several hundred acres of excellent reproduction and pole stands.

These sprayed areas will require observation before future workings can be determined.

Forest Service Camps on Federal Lands

The Forest Service camps were located to meet the objectives established several seasons ago which include the best possible timing for protection of white pine plantations, keeping current the work on reproduction and pole stands on lands dedicated to the growing of white pine, and maintaining a constant vigilance on the recently accelerated cutting program on Federal lands so that where ribes appear they can be eradicated at the proper time. To best meet these objectives, camps were established at Musselshell, Beaver, Sheep Mountain, Three Bear, and Moose Creek.

Camp 191, Musselshell, a semipermanent camp built to accommodate all timber management crews in the area, was occupied again this year. It is centrally located and as the cutting progresses in the Musselshell and Lolo-Eldorado blocks, the area can all be worked from this location. The work this year completed rework in Gold Creek and the west side of Lolo Creek. These areas support stands of 40-60 year old white pine. Cutover areas in Musselshell Creek had initial work this year. Ribes concentrations were light for this type of area. Second working in Deer Creek plantations was completed. Additional work in cutover on Deer Creek was also performed to provide a wider protection strip for the plantations and to protect white pine reproduction appearing on the logged areas.

Stream type in Musselshell Creek was sprayed with Ammate using a Bean-Cutler portable power sprayer. Adverse weather conditions, lack of trained personnel, and a shortage of equipment prevented completing as much of the job as originally contemplated. It is planned to complete the spraying next season of all stream type in the Musselshell drainage.

Crews from this camp also worked in Dan Lee Creek where 167 acres cut over in 1940-44 supported a very heavy stand of young ribes. This was broadcast with 2,4,5-T chemical applied with a Friend power pumper.

Chemical was applied at the rate of 33 gallons per acre at a cost of .81 man-day per acre. Late season examinations indicate an entirely satisfactory kill. A check of the area will be made next spring to determine if follow-up work is needed.

Camp 192, Beaver, was established on June 1 and closed on August 21. In the Beaver Creek drainage, work was principally in 40- to 60-year-old stands. New germination of ribes is still taking place in this area. Hand eradication work was supplemented by the use of Hi-Fog guns applying 2,4-D to the scattered R. petiolare still remaining in the streams. This completes the reworking of the area surrounding the Beaver Creek plantation. This work, while protecting an already established stand of white pine pole, also gives added assurance of protection to the plantation. Future work will be determined from post check data to be obtained in two or three years. In the Alder Creek drainage, reworking of both plantations was accomplished. Some new germination of ribes is still occurring and further working in two years will be necessary.

Camp 193, Sheep Mountain, was established on June 24 and closed on August 27. The area worked was cut over during 1940-44 and following logging, an exceptionally heavy concentration of ribes germinated. It is felt that the peak of germination

is passed although some *R. lacustre* may appear on the north facing slopes. Very little live stem per acre remains on the area following this season's work. A post check in 1951 will be necessary to determine if further working is needed. Hi-Fog guns were used effectively as an aid to hand eradication. Small pieces of ground supporting heavy concentrations of seedlings were eliminated from hand work and treated with 2,4,5-T. In many instances, a few minutes' work with spray accomplished a more thorough and effective job than several hours of hand work would have done.

Camp 194, Three Bear, was established on June 17 and closed on September 2. Rework was performed in the pole stands in the Tamarack Creek drainage. Heavy working conditions were encountered in the upper portions of the area. An unusual number of *R. lacustre* was found sprouting from old crowns. It appears that the past two unusually wet seasons have caused these dormant crowns to sprout. Bushes with 6 to 8 feet of live stem were present. A check on an adjacent area worked two years ago shows the same condition prevailing. This will necessitate another working of the area lying on the east side of Tamarack Creek to place it on maintenance. A careful examination of the bushes now present indicates that no visible live stem may have existed on these plants at the time of last working as all growth is of the past two seasons. This demonstrates a need for periodic post checking to assure that areas once placed on maintenance remain in that condition. Work plans call for two camps in the Tamarack Creek-French Creek area this coming season. This block represents one of the highest priority stands on the Clearwater National Forest.

Camp 195, Moose Creek, was established on June 24 and closed on August 28. Work performed on pole and reproduction stands in the Moose Creek and Independence Creek drainages completed the needed rework in this unit. Additional work in the reproduction type is planned for about three years hence. A post check one year previous to working will determine the volume of work remaining in the unit.

METHODS AND EQUIPMENT

All supervisors were given individual training and instruction prior to assuming their positions. A training school was held for all checkers. Eradication men were given intensive training with the aid of charts in ribes eradication, and at the same time emphasis was placed on reducing man-day costs and safety measures. As has been the case in the past, continual training and instruction were given throughout the season.

Prior to the start of the field season some experimenting was done with the one-man ribes eradication method and it was found to have sufficient merit to warrant its adoption in all Bureau camps. The crews were given initial training in searching technique under the three-man system. Experienced workers were able to change over to the one-man method as soon as they refreshed themselves on ribes identification which was usually within one or two days, but some of the inexperienced men required more training. The Forest Service camps, except Three Bear, put the method in operation near the end of July when the drag lines, necessary in the method, were received. In this method, lanes were run $2\frac{1}{2}$ chains wide with each acre lot being marked so that progress and records could be kept on an acre basis. In the low, rolling country, it was found more feasible to lay lines in cardinal

directions to avoid lanes which were too long for proper supervision and expeditious placing of workers. In steep country, the lines were placed to take advantage of the topography. In some cases where animals were bothersome in tearing out lane lines, it was impractical to have lines laid for more than one day's work, and several men were worked in each lane.

While the actual saving effected by using the one-man method is difficult to measure because of differences in quality of labor and type of ground worked from one season to the next, it is felt that much is gained by using this method. A sense of responsibility is instilled in the workers, unsatisfactory workers are quickly weeded out, less mop-up work is necessary, and a better quality of work is secured.

Chemical work was conducted in conjunction with the hand eradication methods. Ammate and 2,4,5-T were applied with power equipment, while 2,4-D and 2,4,5-T were used in Hi-Fog guns which were employed in stream type and in conjunction with hand eradication in upland types. Power equipment used by the Forest Service crews consisted of a Friend pumper mounted on a $1\frac{1}{2}$ -ton truck and a portable Bean-Cutler unit. Cooperative crews used Bean and Hardie pumpers mounted on $1\frac{1}{2}$ -ton trucks, a small Hardie mounted on a specially designed dual-wheel trailer, and a Bean-Cutler pump mounted on a water trailer. An International T-9 tractor-dozzer was used to pull the trailer units and to repair and clear obstructions from logging roads, either in advance of spraying or as the work progressed. Various types of spray nozzles and atomic heads, spreaders, and tracers or markers were used as suggested by the Methods Project. The following tabulation shows data for the spraying work:

<u>Area</u>	<u>Eradication Type</u>	<u>Equipment</u>	<u>Chemical</u>	<u>Acres</u>	<u>Man- Days</u>	<u>Gallons Spray</u>
Hildebrand	Stream	Hi-Fog Gun	2,4-D	18	52	38
Mutton Gulch	Stream	Hi-Fog Gun	2,4-D	35	114	13
Orogrande	Stream	Hi-Fog Gun	2,4-D	46	41	31
Summit	Cutover	Hardie	2,4,5-T	35	96	1,850
Canal Gulch	Cutover	Bean	2,4,5-T	51	19	475
St. Louis Gulch	Cutover	Small Hardie	2,4,5-T	21	18	646
Dan Lee	Cutover	Friend	2,4,5-T	167	136	5,550
Lolo Cr.	Stream	Hi-Fog Gun	2,4,5-T	7	19	42
Gold Cr.	Stream	Hi-Fog Gun	2,4,5-T	*	21	6
Musselshell Cr.	Stream	Bean-Cutler	Ammate	37	88	14,970
Beaver	Stream	Hi-Fog Gun	2,4-D	*	49	98
Sheep Mt.	Cutover	Hi-Fog Gun	2,4,5-T	**		45

* - Acreage included with hand eradication

** - Acreage and man-days included with hand eradication

CHECKING

The Forest Service employed four checkers and the Bureau three to perform the regular check, advance check, post check, and to lay lanes and boundaries for ribes eradication work. These men had some previous checking experience and four of them had several years' experience in both ribes eradication and checking.

Checking was completed on all worked areas. A check was made in advance of ribes eradication work where information on ribes distribution was needed. A check was also run on several pieces of ground where work is planned for 1949.

To obtain a sample check of each acre worked by the one-man method, several methods were tried including a meandering course through each $2\frac{1}{2}$ -chain crew lane. However, the method employed by the Oregon operation proved most satisfactory for this operation. Strips were run at right angles through the crew lane at 4-chain intervals, which placed one strip through the center of each acre. The usual data were plotted on a duplicate of the eradication map to show the results for each acre. This method provides a systematic and impartial check of each man's work and can be satisfactorily performed by the beginning checker.

SURVEYS

A crew of five to seven men was employed on stocking and damage survey work. They were trained at a special school conducted on the St. Joe National Forest. Field work started on June 21 and continued until September 16. Some reproduction stands were examined but most of the work was conducted in pole-size stands. Surveys were conducted in the following drainages:

Siberia and Dutchman Creeks	T. 35 and 36 N., R. 6 E.
Three Mile Creek	T. 37 N., R. 5 E.
Preacher Gulch	T. 36 N., R. 6 E.
Gold Creek	T. 35 and 36 N., R. 6 E.
Moose-Independence Creek	T. 39 and 40 N., R. 10 and 11 E.
Musselshell Creek	T. 35 N., R. 6 E.
Cole Creek	T. 36 N., R. 6 E.
Tumble-Lodge Creeks	T. 39 N., R. 7 E.
Mud Creek	T. 33 N., R. 6 E.
French, Tamarack, Sylvan	T. 37 N., R. 7 E.
Orofino Creek	T. 36 N., R. 6 E.
Rosebud Creek	T. 36 N., R. 6 E.

The information obtained from this survey will be compiled during the winter and used in working unit analyses. It is apparent that there is more infection in pole stands than had been realized and in some instances the stocking of white pine was less than earlier reports had shown. As a result, there will be some revision of the area classification data. If funds are available, it may be desirable to intensify the survey on some areas, depending upon what is shown when the compilations are completed.

CONTROL STATUS

The status of blister rust control work on the Clearwater National Forest is in a favorable condition although blister rust infection occurs generally throughout the control area. The size of recent programs has been adequate. The work plan assures proper timing of work on white pine plantations and on those areas of natural reproduction and pole which are being considered for protection. The accelerated program of cutting is projecting more cutover acreage into the picture each year and this will undoubtedly necessitate an expansion in the near

future. Results of surveys conducted this season on pole stands, when tabulated, could also very likely indicate an increase in the size of the program. This increase in the cutting acreage and the extension of activities into more pole stands is being incorporated into the over-all plan. Cutting practices are being followed with a view to limiting ribes regeneration as much as possible and the blister rust control program is being given full consideration in any plans regarding planting white pine.

On the lands of the Clearwater Timber Protective Association, a different situation exists. Areas are being logged at a much faster rate than can be protected with the present control program. Blister rust infection is general over the entire area and although there have been no known bad wave years since 1941, there is a steady annual increase in the amount of infection. Control efforts are necessarily being confined to the Pierce, Hollywood, and Headquarters blocks where white pine stocking, cost of protection, accessibility of areas, and representative age classes give these blocks highest priority. On older cutting areas where the work was kept on a better schedule, there is now only light pine infection while on some unprotected areas the white pine reproduction has been almost entirely lost. It presents a very discouraging picture when such large blocks of white pine producing land as are found in the cutover areas on Washington, Meadow, Casey, and Parallel Creeks cannot be included in the present program. Logging of white pine is progressing at the rate of over 8,000 acres per year, and while some of this is not being cut to encourage white pine reproduction, there is far more area reproducing satisfactorily than can be protected under the present program. Much of the mature timber in the approximately 8,000 acres which are being logged annually was classed as being on maintenance but it now reverts to the unworked category. Very little area worked in 1948 on Clearwater Timber Protective Association lands can be placed on maintenance because much of the ground has not become stabilized. This is true, to a lesser degree, on lands within the Clearwater National Forest where work was performed on recent cuttings, stream type, and young plantations.

For the entire Clearwater operation, there is a total of 86,779 acres on maintenance. As a result of ribes eradication, checking, and survey work during the 1948 field season, 1,009 acres were placed on a maintenance basis and 3,310 acres were removed from this classification because of logging operations and surveys.

STATEMENT OF EXPENDITURES AND COSTS

The following tables show the statement of expenditures by the cooperative agency and the type of appropriation.

TABLE 1

EXPENDITURES BY APPROPRIATIONS, CALENDAR YEAR 1948 CLEARWATER OPERATION

Cooperating Agency	Appropriation	Amount
Bureau of Entomology and Plant Quarantine	Regular BLR-1-4	\$ 17,126.70
	Regular BLR-3-4	26,912.53
	Subtotal	44,039.23
State of Idaho Clearwater Timber Protective Association	State BLR-3-4	8,347.54
	Private BLR-3-4	6,502.78
	Subtotal	14,850.32
Forest Service	Regular BLR-4	166,371.40
Total		\$225,260.95

TABLE 2

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1948
CLEARWATER OPERATION

Item	Bureau of Entomology and Plant Quarantine				Forest Service	
	Regular BLR-1-4	Regular BLR-3-4	State and Private BLR-3-4	Total	Regular BLR-4	Total
Sal. perm. men	\$10,982.22	\$ 276.40		\$11,258.62	\$ 6,217.80	\$ 17,476.42
Sal. temp. men		7,010.01	\$ 3,676.00	10,686.01	29,753.59	40,439.60
Wages, temp. labs.		16,251.28	11,174.32	27,425.60	62,780.99	90,206.59
Subs. supplies	2,593.14	1,967.55		4,560.69	44,444.94	49,005.63
Equipment		65.92		65.92	1,071.18	1,137.10
Travel & Transp.	958.58	643.56		1,602.14	2,361.49	3,963.63
Other Supplies	2,592.76	697.81		3,290.57	19,741.41	23,031.98
Total	\$17,126.70	\$26,912.53	\$14,850.32	\$58,889.55	\$166,371.40	\$225,260.95

TABLE 3

SUMMARY OF RIBES ERADICATION, 1948
CLEARWATER OPERATION

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
First	Cutover	1945-49	132	28	2,777	.21	21
	Cutover (4)	1940-44	2,340	2,480	584,829	1.06	250
	Stream (1)		44	128	17,600	2.91	400
	Total		2,516	2,636	605,206	1.05	241
Second	Plantation	1945-49	148	132	1,772	.89	12
	Cutover	1940-44	204	644	145,789	3.16	715
	Cutover	1920-39	123	113	1,082	.92	9
	Reproduction	1910-39	744	1,376	61,617	1.85	83
	Pole		2,577	1,521	78,377	.59	30
	Stream (2)		35	114	3,900	3.26	111
	Total		3,831	3,900	292,537	1.02	76
Third	Plantation	1940-44	60	77	1,646	1.28	27
	Cutover	1920-39	213	182	7,603	.85	36
	Reproduction	1910-39	717	617	15,502	.86	22
	Pole		1,323	579	22,484	.44	17
	Stream (3)		64	142	13,730	2.22	215
	Total		2,377	1,597	60,965	.67	26
GRAND TOTAL			8,724	8,133	958,708	.93	110

Chemical work included above:

Stream				Upland			
	Acres	Man-Days	Gallons Spray		Acres	Man-Days	Gallons Spray
(1)	44	128	15,018	(4)	274	269	8,521
(2)	35	114	58				
(3)	64	142	167				

TABLE 4

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1948
CLEARWATER OPERATION

State	Working	Class	Acres	Man-Days	Ribes	Gallons Spray	Per Acre	
							Man-Days	Ribes
Idaho	First	EQ-Coop.	1,723	2,052	290,147	2,971	1.19	168
		FS-Reg.	793	584	315,059	20,568	.74	397
		Total	2,516	2,636	605,206	23,539	1.05	241
	Second	EQ-Coop.	208	271	9,158	13	1.30	44
		FS-Reg.	3,623	3,629	283,379	45	1.00	78
		Total	3,831	3,900	292,537	58	1.02	76
	Third	EQ-Coop.	277	275	18,883	69	.99	68
		FS-Reg.	2,100	1,322	42,082	98	.63	20
		Total	2,377	1,597	60,965	167	.67	26
	All Workings	EQ-Coop.	2,208	2,598	318,188	3,053	1.18	144
		FS-Reg.	6,516	5,535	640,520	20,711	.85	98
		Total	8,724	8,133	958,708	23,764	.93	110

TABLE 5

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1948
CLEARWATER OPERATION

State	Working	Acres Worked											
		By Forest Service				By Bureau of Entomology and Plant Quarantine			Total				
		National Forest	State	Private	Total	State	Private	Total	National Forest	State	Private	Total	Total
Idaho	First	639	16	138	793	215	1,508	1,723	639	231	1,646	1,877	2,516
	Second	3,096	336	191	3,623		208	208	3,096	336	399	735	3,831
	Third	1,636	464		2,100		277	277	1,636	464	277	741	2,377
	Total	5,371	816	329	6,516	215	1,993	2,208	5,371	1,031	2,322	3,353	8,724

TABLE 6

RIBES SPECIES ERADICATED, 1948
CLEARWATER OPERATION

Working	Eradication Type	Acres	Ribes Species			Total Ribes
			Ribes lacustre	Ribes viscosissimum	Ribes petiolare	
First	Cutover (1945-49)	132	346	2,431		2,777
	Cutover (1940-44)	2,340	99,635	479,223	5,971	584,829
	Stream	44			17,600	17,600
	Total	2,516	99,981	481,654	23,571	605,206
Second	Plantation (1945-49)	148	1,491	281		1,772
	Cutover (1940-44)	204	2,138	143,651		145,789
	Cutover (1920-39)	123	189	873	20	1,082
	Reproduction (1910-39)	744	29,192	32,412	13	61,617
	Pole	2,577	28,725	49,635	17	78,377
	Stream	35			3,900	3,900
	Total	3,831	61,735	226,852	3,950	292,537
Third	Plantation (1940-44)	60	1,055	591		1,646
	Cutover (1920-39)	213	3,005	4,308	290	7,603
	Reproduction (1910-39)	717	12,895	2,488	119	15,502
	Pole	1,323	8,147	14,331	6	22,484
	Stream	64			13,730	13,730
	Total	2,377	25,102	21,718	14,145	60,965
All Workings	Plantation (1945-49)	148	1,491	281		1,772
	Cutover (1945-49)	132	346	2,431		2,777
	Plantation (1940-44)	60	1,055	591		1,646
	Cutover (1940-44)	2,544	101,773	622,874	5,971	730,618
	Cutover (1920-39)	336	3,194	5,181	310	8,685
	Reproduction (1910-39)	1,461	42,087	34,900	132	77,119
	Pole	3,900	36,872	63,966	23	100,861
	Stream	143			35,230	35,230
	Total	8,724	186,818	730,224	41,666	958,708

TABLE 7

SUMMARY OF RIBES ERADICATION, 1929-1948
CLEARWATER OPERATION

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Plantation	1945-49	201	488	28,307	2.43	141	201	
	Cutover	1945-49	132	28	2,777	.21	21	132	13,133
	Plantation	1940-44	60	232	134,749	3.87	2,246	60	
	Cutover (4)	1940-44	9,137	12,084	5,303,596	1.32	580	9,137	26,072
	Cutover	1920-39	39,113	40,222	13,653,624	1.03	349	35,290	29,890
	Reproduction	1910-39	71,993	109,096	33,469,252	1.52	465	70,780	3,584
	Pole		31,076	18,314	3,874,014	.59	125	29,431	5,180
	Mature		219,289	99,880	23,422,354	.46	107	156,119	38,728
	Miscellaneous		5,852	3,900	1,700,804	.67	291	5,416	7,819
Second	Stream (1)		42,416	78,363	14,095,744	1.85	332	42,416	13,612
	Total		419,269	362,607	95,685,221	.86	228	348,982	139,018
	Plantation	1945-49	201	287	20,183	1.43	100	201	
	Plantation	1940-44	60	194	15,587	3.23	260	60	
	Cutover	1940-44	724	1,263	203,760	1.74	281	724	
	Cutover	1920-39	31,178	30,264	8,252,732	.97	265	31,178	
	Reproduction	1910-39	26,836	41,997	3,789,309	1.56	141	26,760	
	Pole		19,025	10,070	1,210,653	.53	64	18,386	
	Mature		16,333	7,983	815,665	.49	50	14,173	
Third	Miscellaneous		511	573	371,107	1.12	726	511	
	Stream (2)		23,815	27,080	3,333,043	1.14	140	23,815	
	Total		118,683	119,711	18,012,039	1.01	152	115,808	
	Plantation	1940-44	120	122	2,762	1.02	23	120	
	Cutover	1920-39	15,795	15,395	1,128,209	.97	71	15,795	
	Reproduction	1910-39	7,981	10,642	473,682	1.33	59	7,981	
	Pole		3,166	1,734	48,819	.55	15	3,166	
	Stream (3)		3,434	4,033	410,090	1.17	119	3,434	
	Total		30,496	31,926	2,063,562	1.05	68	30,496	
GRAND TOTAL			568,448	514,244	115,760,822	.90	204	495,286	

Chemical work included above:

Stream				Upland			
	Acres	Man-Days	Gallons Spray		Acres	Man-Days	Gallons Spray
(1)	15,090	31,430	811,403	(4)	335	371	23,221
(2)	5,910	8,256	120,043				
(3)	924	1,556	25,281				

TABLE 8

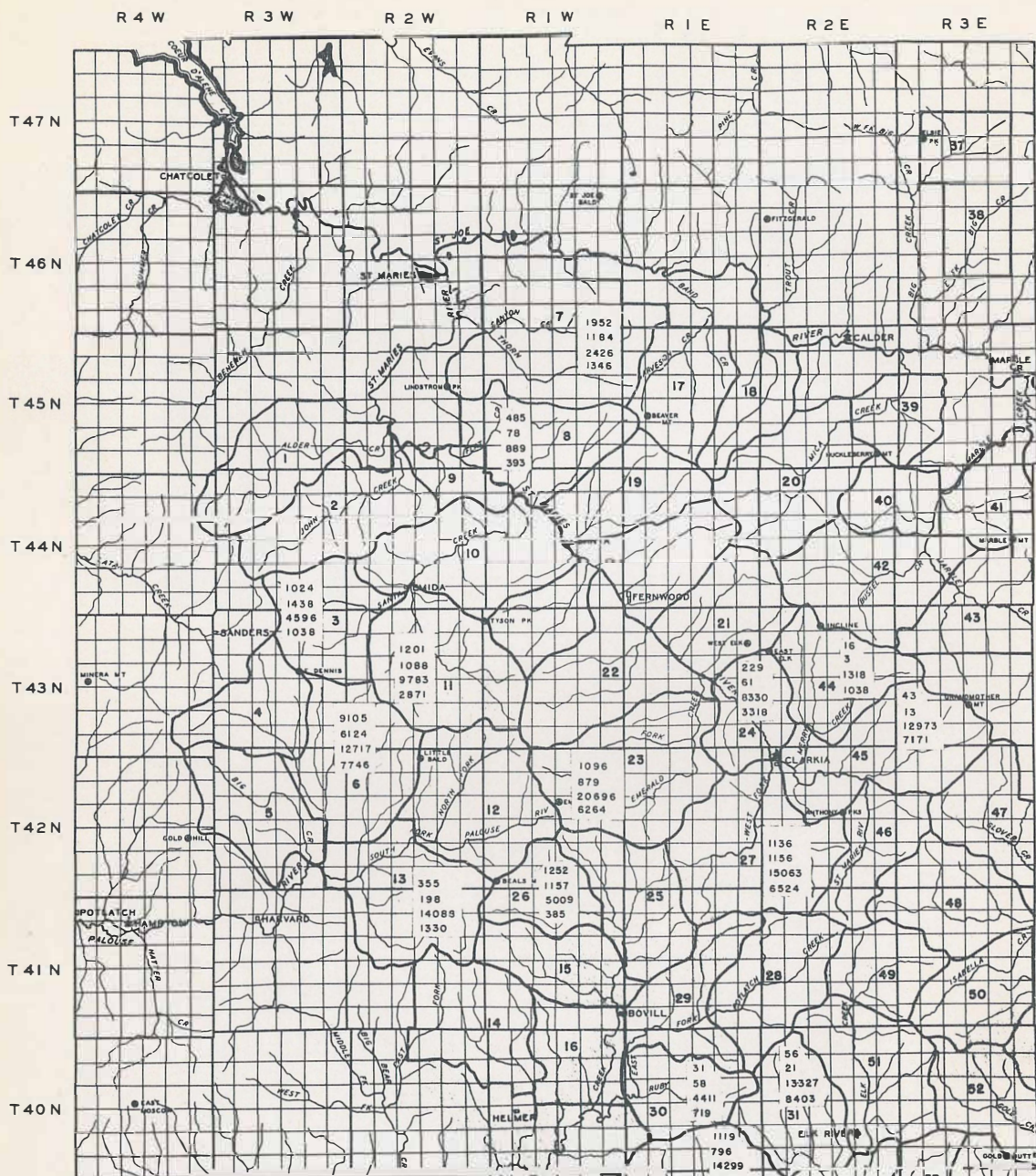
SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1929-1948
CLEARWATER OPERATION

State	Class	Gross Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
						Man-Days	Ribes
Idaho	EQ-Reg.	4,412	5,273	1,129,228	79,864	1.20	256
	EQ-Coop.	58,807	54,714	7,666,894	158,382	.93	130
	EQ-Emerg.	133,970	125,277	30,398,093	136,847	.94	227
	FS-Reg.	127,869	117,730	29,429,942	171,543	.92	230
	FS-Emerg.	55,908	45,382	14,895,022	24,015	.81	266
	CCC	187,482	165,868	32,241,643	408,597	.88	172
	Total	568,448	514,244	115,760,822	979,248	.90	204

TABLE 9

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1929-1948
CLEARWATER OPERATION

State	Ownership	Net Acreage in Control Area					
		Acres Worked				Unworked	Total Acres
		First	Second	Third	Total		
Idaho	National Forest	151,294	56,778	11,894	219,966	49,058	200,352
	Public Domain	3,690	708	52	4,450	340	4,030
	Subtotal Federal	154,984	57,486	11,946	224,416	49,398	204,382
	State	59,468	14,505	2,319	76,292	30,790	90,258
	Private	134,530	43,817	16,231	194,578	58,830	193,360
	Subtotal Other	193,998	58,322	18,550	270,870	89,620	283,618
	Total	348,982	115,808	30,496	495,286	139,018	488,000

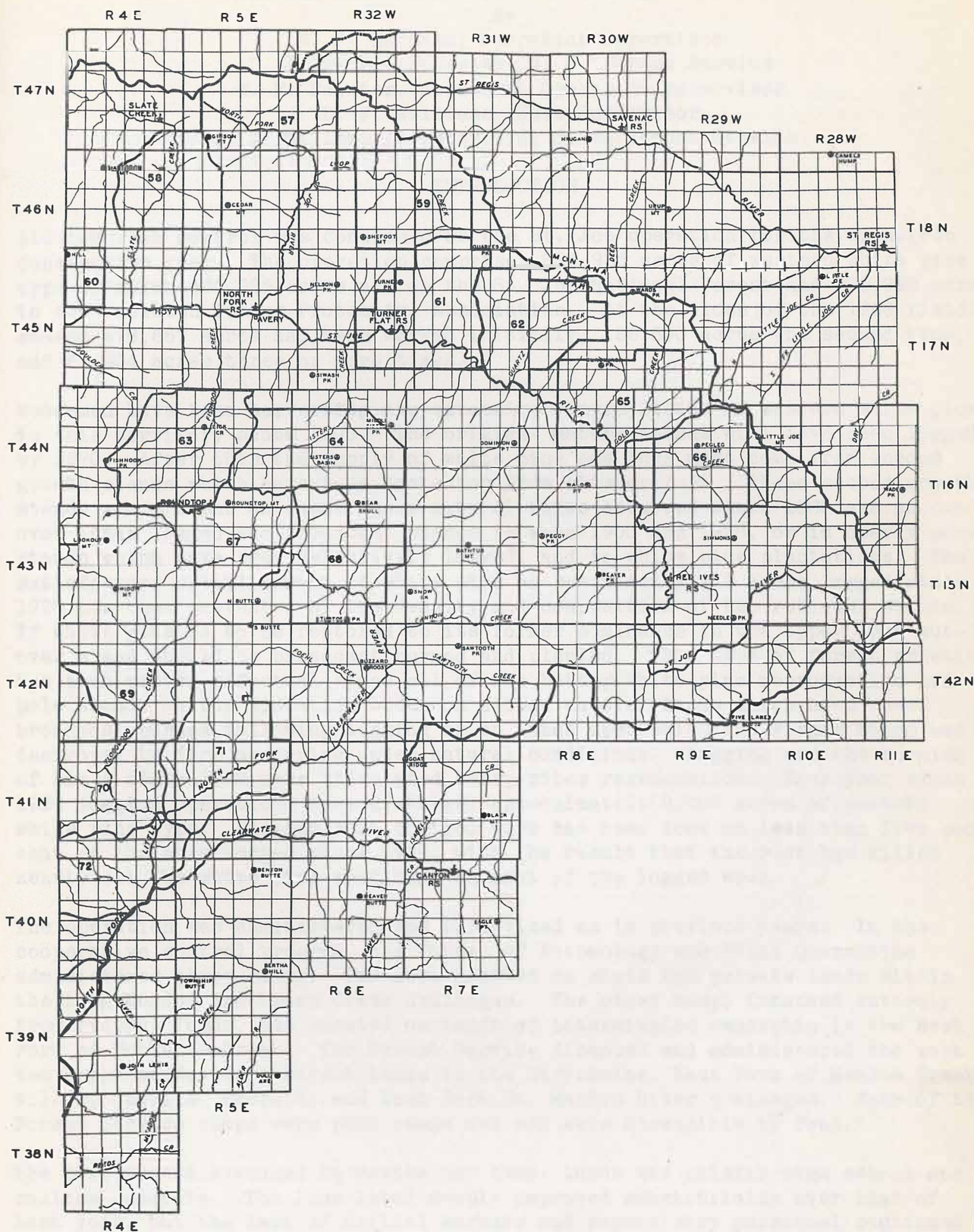


ST. JOE OPERATION

BLISTER RUST CONTROL WORKING UNITS

WORKING UNIT RECORD

1. ACRES WORKED 1948
2. MAN-DAYS 1948
3. TOTAL ACRES FIRST WORKING
4. TOTAL ACRES MAINTENANCE



BLISTER RUST CONTROL, ST. JOE OPERATION, 1948

By

H. J. Hartman, Operation Supervisor

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INTRODUCTION

Blister rust control was continued on the St. Joe operation for the twentieth consecutive year. The operation comprises 384,925 acres of western white pine type of which 504,985 acres are in the St. Joe National Forest and 379,940 acres in the Potlatch Timber Protective Association. At the close of the 1948 field season 478,667 acres had been worked initially, 166,500 acres the second time, and 63,804 acres three or more times.

Woodsmen have been harvesting the extensive virgin stands of western white pine in this territory since 1900. The original mature stands will have been logged by 1970. After this the supply of white pine saw logs must come from second growth stands which have been protected from blister rust. These second growth stands are present on lands where natural burns occurred since 1880 and on cut-over lands logged and broadcast burned between 1900 and 1928, or in nearly pure stands which have been selectively logged, and in white pine plantations. The satisfactory establishment of white pine on practically all areas logged since 1928 has been prevented by the density and composition of the residual stands. If white pine is to be restored to its former dominance in the type, most cut-over areas should be broadcast burned and planted. This type of forest practice has been proven effectual since all of the better white pine reproduction and pole stands on the operation occur on either cutover lands which have been broadcast burned following logging or on lands upon which the virgin stand was destroyed by fire occurring under natural conditions. Logging and the burning of slash since 1928 have stimulated heavy ribes regeneration. Each year since 1938 logging operations have disturbed approximately 8,000 acres of western white pine type. Blister rust control work has been done on less than five per cent of the area logged since 1928, with the result that the rust has killed nearly all the white pine seedlings on most of the logged area.

The operation was administered and supervised as in previous years. In the cooperative control program, the Bureau of Entomology and Plant Quarantine administered three camps. Two were located on state and private lands within the Long Meadow and Thorn Creek drainages. The other camp, financed entirely from federal funds, was located on lands of intermingled ownership in the West Fork of Potlatch Creek. The Forest Service financed and administered the work of ten camps on National Forest lands in the Strychnine, East Fork of Meadow Creek, Willow, Charlie, Emerald, and West Fork St. Maries River drainages. Four of the Forest Service camps were pack camps and six were accessible by road.

The work season averaged $2\frac{1}{2}$ months per camp; labor was chiefly high school and college students. The June labor supply improved substantially over that of last year, but the lack of skilled workers and supervisory personnel continued to be critical. The July and August labor turnover was high and replacements were

not available. Practically all camps operated at half strength during these months. Labor efficiency improved over that of 1947, but is still below prewar levels.

The 48-hour work week definitely reduced effective man-day costs and at the same time increased productivity and improved the morale of the workers. The 48-hour work week policy should be continued. All workers were authorized to work 48 hours per week when weather permitted, with a guarantee of 40 hours. The first 8 hours of work lost during the week were rescheduled for Saturday at straight time. In the three Bureau camps, 464 man-days lost during the unusually wet field season were made up on Saturdays and 222 man-days were worked as overtime.

At the peak of employment there were 450 employees in the 10 Forest Service camps and 140 in the 3 Bureau camps. No time was lost from blister rust work due to fire fighting duty.

The Forest Service established and operated a reception center at Laird Park. All workers for the four road and four pack camps in that vicinity were assigned through that temporary field station.

LOCATION AND DESCRIPTION OF AREAS

Drainage	T	R	S	Date Established	Date Closed	Class of Labor	Size
BUREAU - COOPERATIVE CAMPS							
Syringa Creek	45N	2W	12	June 1	Aug. 28	Students	50
Feather Creek	41N	1W	1	June 8	Aug. 21	"	50
Butterfield Creek	39N	1E	2	June 15	Aug. 2	"	40
FOREST SERVICE CAMPS							
Willow Creek	43N	2W	6	May 24	Sept. 8	Students	45
Dry Fork Strychnine Cr.	42N	2W	18	May 26	Sept. 9	"	45
W. Fork Emerald Creek	43N	1E	32	June 3	Aug. 18	"	45
Charlie Creek	43N	2W	14	June 7	Aug. 21	"	45
Excavation Gulch	43N	2W	33	June 8	Aug. 28	"	45
Excavation Gulch	42N	2W	16	June 11	Sept. 3	"	45
Mazie Creek	42N	1E	24	June 18	Sept. 3	"	45
Excavation Gulch	42N	2W	9	June 25	Aug. 21	"	45
Wepah Creek	43N	2W	32	June 29	Aug. 16	"	45
E. Fork Meadow Creek	43N	3W	25	July 8	Aug. 12	"	33

The relatively small ribes eradication program was directed toward completing control in the well-stocked reproduction and pole stands.

East Fork of Meadow Creek, Unit No. 6. There is a total of 19,655 acres in this unit, of which 11,309 are white pine pole 41-60 years of age which regenerated on an 1887 burn. This unit supports one of the larger and better blocks of white pine pole on the forest. The remaining 8,346 acres are in a deferred status, of which 7,553 are cutover and 793 acres are mature. The area was worked initially in 1934. In 1948, 9,440 acres of the white pine pole were worked the second time. In the Strychnine Creek drainage a considerable amount of snow damage had taken place in this even-aged stand. In many areas of an acre or more, the snow

had broken down 50 to 75 per cent of the trees, and heavy ribes regeneration resulted. One more working will be necessary on portions of the area to reduce it to maintenance standards. As a result of the 14-year interval between workings, 20 per cent of the white pine pole had been damaged by blister rust.

Ten acres of heavy stream type were within the pole stand. A truck-mounted power spray unit was used in treating the area with ammonium sulfamate. An average of 2.6 man-days per acre was required for this treatment. The Forest Service operated four pack camps and two road camps in this area. The pole area worked averaged .67 man-day and 22 ribes per acre. One camp season will be required to complete the second working of the pole area in this unit.

Upper Santa Creek and Ramskull, Unit No. 3. There are approximately 13,000 acres in this unit, of which 5,765 acres are excellent white pine pole, reproduction, and plantations. Most of the area has been worked twice and some the third time. Additional workings will be necessary for parts of the area in order to place the entire area on maintenance. The remaining acreage in the unit is cutover on which work has been deferred until it has been broadcast burned and planted. The 1948 disease survey showed that 19 per cent of the Ramskull Creek plantation and 27 per cent of the pole stand in Willow Creek was damaged. One Forest Service camp in this unit worked 1,024 acres, which averaged 1.40 man-days and 52 ribes per acre. It will require two camp seasons to complete the work required in this unit.

Charlie Creek, Unit No. 11. This unit contains 7,680 acres of pole, reproduction, and plantations. Most of the area has been worked twice and is nearly free of ribes. In 1948 the 1,200 acres requiring second and third working on the East Fork were completed by a Forest Service camp. The work averaged .91 man-day and 15 ribes per acre. This area was worked last in 1938. The 1948 disease survey showed 16 per cent of the pole and 3 per cent of the 10-year-old plantation to be damaged.

Emerald Creek, Unit No. 23. This unit supports 14,000 acres of pole and reproduction. The reproduction has regenerated on lands which were logged and broadcast burned between 1912 and 1928. The stream type supported heavy concentrations of *Ribes petiolare*. Heavy regeneration of ribes occurred in the upland areas following the broadcast burns. Blister rust was introduced in this unit in 1927. The upper limits of the drainage were never placed on maintenance and 53 per cent of the present stocking in that portion of the unit has been damaged. The lower limits of the drainage have been placed on maintenance and the rust damage is light. The one Forest Service camp in this unit concentrated on third working of areas that were not on maintenance. The 1,096 acres worked averaged .80 man-day and 6 ribes per acre.

West Fork of St. Maries River, Unit No. 27. This unit contains 13,000 acres of white pine pole and reproduction. The well-stocked reproduction stands regenerated on areas that were broadcast burned between 1912 and 1928, following logging. The unit is potentially the best white pine producing area on the operation. Three workings have placed most of the unit on maintenance. Blister rust was introduced in 1927. Initial work was started in 1933 and completed in 1936. From the time blister rust was introduced until control was established, 21 per cent of the pine had been damaged. This year one Forest Service camp

worked the pole stand between Long Slim and Log Creeks. The 1,087 acres worked averaged 1.06 man-days and 5 ribes per acre.

Thorn Creek, Unit No. 7. This unit supports a 2,500-acre block of reproduction and pole. The remainder of the unit has been logged and is in a nonreproductive state. In 1948, 2,437 acres were worked for the second time. The area was worked initially in 1935. Syringa Creek drainage was spot-logged between 1940 and 1945 to remove a light overstory of mature trees. Ribes regeneration had taken place on all disturbed areas. The working of a large spot burn adjacent to the pole stand required about one-half of the total effective time of the one Bureau camp in the unit. The camp area averaged .52 man-day and 85 ribes per acre. The 1948 disease survey showed three per cent of the pole stand damaged.

Cougar Creek, Unit No. 26. This unit contains approximately 4,200 acres of reproduction which regenerated on clear-cut lands that had been broadcast burned in 1914 and again in 1923. The upper limits of this unit are poorly stocked and support a very dense stand of brush, which has never been worked. The better-stocked portion of the unit was initially worked in 1934 and 1936. This year 1,252 acres were worked the second time by a cooperative camp. The area averaged .86 man-day and 23 ribes per acre. The remainder of the control area of the unit will be given second working next year. Blister rust damage runs from 10 to 26 per cent.

Long Meadow Creek, Unit No. 32. Practically all of this unit was selectively logged between 1925 and 1945, and the present stand is a mixed age class. There are about 8,500 acres of white pine pole and reproduction. Most of the well-stocked portion of the unit has been given three workings. One cooperative camp completed the present required work on the unit. The 1,206 acres worked averaged .73 man-day and 10 ribes per acre. The 1948 disease survey showed that there was three per cent damaging infection on the reproduction stands around Butterfield Meadows.

METHODS AND EQUIPMENT

The one-man method of ribes eradication was used nearly 100 per cent in all camps on areas supporting medium to light concentrations of ribes. Greater production was obtained through the use of this method, and it will be more widely used and greatly improved during the coming year. Unskilled workers miss ribes while working alone as they do when working in three-man crews; however, poor quality work is detected quickly and the workers' errors corrected. Only the poorly worked strips need to be reworked. When difficult working conditions were encountered and when working uphill, the worker always laid out his drag line in advance of the actual working of the strip. This gives the worker more freedom for systematic search. A greater width of strip can be taken and a much higher quality and quantity of work results. When more skilled workers are available, this method will very greatly increase the productivity of the ribes eradication crews.

A Bean power sprayer was used to apply ammonium sulfamate to dense ribes concentrations occurring along streams and in the upland of recently-logged areas that were accessible by road. Power sprayers will be widely used as soon as

sufficient funds are made available to permit the eradication of ribes on extensive cutover areas.

Hi-Fog guns were used to apply 2,4,5-T to upland ribes occurring on spot burns that were not accessible by road. The spray solution was one part 2,4,5-T to 19 parts stove oil. The areas sprayed during the summer were inspected in October and it appeared that a 100 per cent kill would result. Ammonium sulfamate and 2,4-D were used extensively in ribes decapitation work.

Contract work was undertaken this season for the first time on the St. Joe operation. Difficulty was experienced in finding prospective bidders. The Forest Service awarded a contract to an assistant camp boss August 25. An area of 42.7 acres of open reproduction was selected since it was typical of many areas on which protection standards have been found most difficult to meet when worked with regular crews. After completing the first designated 15-acre unit of the area on September 11, the contractor, unable to find qualified partners, requested release from the remainder of the contract. On the completed unit 46 ribes per acre were removed at a rate of .77 man-day per acre. The gross cost to the government was \$21.15 per acre, which was estimated to be about 75 per cent of the expected cost had regular crews been used.

Several plots totaling 330 acres have been surveyed for contract work, and are designated for early advertisement in 1949.

CHECKING

The quality of checking increased noticeably in 1948 and compared very favorably to prewar standards. A sufficient number of older qualified men were available as trainees and all workers seemed more sincere and interested in doing high caliber work. Nine of the 14 men who checked in 1947 were available in 1948. This represented the highest number of experienced men returning since the war. The checking personnel consisted of a checker foreman, an annual employee of the Forest Service; and 12 checkers whose salaries were financed jointly by the Forest Service and the Bureau. The checker foreman was responsible for the training and supervision of the men in the field. The over-all direction of checking activities was continued by the Bureau under the direction of the assistant operation supervisor. Checkers, in addition to regular and post check duties, assisted in laying out work areas for the one-man drag line method of ribes eradication.

The 1947 checking procedure was followed on all post check and maintenance areas and on all areas not worked by the one-man drag line method. In checking the $2\frac{1}{2}$ -chain wide lane used in the one-man ribes eradication method, a checker inspected each lane its entire length by following a meandering course and searching an 8-foot wide strip. Ribes were recorded as found within each $2\frac{1}{2}$ -chain wide lane, then summarized by 5-chain transects and plotted in red on the regular ribes eradication camp map scale 16 inches to the mile.

In addition to the inspection of 19,100 acres of current season's work, a total of 22,704 acres on which work is contemplated in 1949 was inspected. An analysis of the checking activities indicated that 44 per cent of the total time was spent on regular check, 43 per cent on post check, and 13 per cent assisting ribes eradication.

CONTROL STATUS

Definite progress is being made each season in reducing the ribes population in the reproduction and pole stands to satisfactory standards. On December 31, 1948, there were 165,346 acres classified as maintenance, which represents a net gain of 14,336 acres during the current season. Of this acreage, 7,620 resulted from the current ribes eradication work and 6,716 acres were the result of post check inspections. A further breakdown of the total maintenance area indicates that 120,520 acres are reproduction and pole, and 44,826 acres mature. Periodic inspections will be necessary in the reproduction and pole stands to evaluate ribes conditions, but it is safe to assume that only a minimum amount of work will be necessary to carry the stands through to maturity. The 44,826 acres of mature classified as maintenance will revert to an unworked status when logged. In 1947, logging operations changed the maintenance status on 460 acres.

SURVEYS

A survey to determine the blister rust damage and the stocking of pole and reproduction stands of western white pine was made a regular project in 1948. Three two-man crews carried on the survey work until August 9, when four more men were assigned. The work continued until September 11, when the crew members returned to school. Two crews composed of supervisory personnel from the Bureau and Forest Service were then organized and the survey work was continued until October 26. The Bureau provided the technical supervision during the training period in early June and provided assistance throughout the season. The project was financed from Forest Service funds and a forest officer was chief of party.

The work was directed primarily to pole stands 30 to 70 years of age since this represented the age class for which no pine infection data were available. The survey was extensive in nature in order to obtain an over-all picture of the disease conditions in pole stands. Reproduction stands were examined where the extent of damage was not known or in units where the advisability of control work was questionable.

The 160 miles of strip were run at the rate of 62 chains per two-man crew per day. Areas in 37 units were examined. An analysis of data revealed damage to pole stands 30 years of age and older varied from 3 to 63 per cent. The four areas of pole-sized timber listed in the following table illustrate the effect of blister rust damage on the ultimate yields from the stands at maturity:

Area	Age	Site	Origin of Pine Infection (Year)	Per Cent of WWP in Original Stand	Per Cent Damage to Pine Stocking	Per Cent of Pine in Present Stand	Calculated Yield of WWP From Present Stand at Maturity BF/Acre
Meadow Creek and Strychnine Creek	50	II	1931	26	21	22	13,800
Lacy Creek	50	I & II	1933	45	16	41	30,200
W. F. St. Maries River	50	II	1927	33	63	14	9,150
W. F. Emerald Creek	55	II	1927	37	49	23	15,300

The Meadow Creek-Strychnine Creek stand is typical of the pole stands of the St. Joe operation. Even though the white pine in the drainages received 21 per cent damage from blister rust, the per cent of white pine in the stand as a whole was reduced only 4 per cent and the expected yield of white pine at 120 years will be approximately 14,000 board feet per acre. The well-stocked Lacy Creek area is expected to yield over 30,000 board feet per acre at 120 years of age. The most severe damage to pole was on the West Fork of the St. Maries River. A well-stocked stand originally 33 per cent white pine has been damaged to a point where a yield of less than 10,000 board feet of white pine per acre can be expected.

A number of pole stands have received considerable damage, yet the expected yield is still sufficient to warrant control work. The 55-year-old stand on the West Fork of Emerald Creek is a typical example.

Information gained from this survey will be helpful for area classification work and will aid in establishing priority of work areas. The general survey for the operation will be completed next year.

Pole Blight Areas

During the 1948 field season nearly all large stands of western white pine pole on the St. Joe operation were inspected to obtain additional blister rust control information. In the course of these surveys the following probable pole blight centers were observed:

- a. Alder Creek, $SE\frac{1}{4}$ sec. 4 and $NE\frac{1}{4}$ sec. 9, T. 44 N., R. 3 W.
- b. Beaver Creek, $NW\frac{1}{4}$ sec. 30, T. 45 N., R. 1 E.
- c. West Fork of Emerald Creek, sec. 32, T. 43 N., R. 1 E.

All of the pole blight areas were 50 acres or more in extent. Nearly all pole blight symptoms were evident and the disease was found in all stages in the 40- to 60-year-old white pine stands. However, Armillaria mellea was found on many of the damaged trees. The Emerald Creek pole blight area represents the southern known limit of the disease. No pole blight has been discovered on lands of the Potlatch Timber Protective Association.

STATEMENT OF EXPENDITURES AND COSTS

The statement of expenditures is shown in the following tables by the cooperative agency and the type of appropriation:

TABLE 1

EXPENDITURES BY APPROPRIATIONS, CALENDAR YEAR 1948 ST. JOE OPERATION

Cooperating Agency	Appropriation	Amount
Bureau of Entomology and Plant Quarantine	Regular BLR-1-4	\$ 19,497.11
	Regular BLR-3-4	35,238.38
	Subtotal	\$ 54,735.49
State of Idaho Potlatch Timber Protective Association	State BLR-3-4	\$ 8,070.33
	Private BLR-3-4	5,396.16
	Subtotal	\$ 13,466.49
Forest Service	Regular BLR-4	\$284,831.53
Total		\$353,033.51

TABLE 2

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1948
ST. JOE OPERATION

Item	Bureau of Entomology and Plant Quarantine				Forest Service	Total
	Regular BLR-1-4	Regular BLR-3-4	State and Private BLR-3-4	Total	Regular BLR-4	
Sal. perm. men	\$14,651.80	\$ 3,691.36		\$18,343.16	\$ 10,726.19	\$ 29,069.35
Sal. temp. men	190.29	7,585.15	\$ 1,894.44	9,669.88	43,782.71	53,452.59
Wages, temp. labs.	228.70	22,537.33	11,572.05	34,338.08	147,572.62	181,910.70
Subs. supplies		177.48		177.48	53,436.65	53,614.13
Equipment					12,138.57	12,138.57
Travel and transp.	1,175.35	822.12		1,997.47	10,144.81	12,142.28
Other supplies	3,250.97	424.94		3,675.91	7,029.98	10,705.89
Total	\$19,497.11	\$35,238.38	\$13,466.49	\$68,201.98	\$284,831.53	\$353,033.51

TABLE 3

SUMMARY OF RIBES ERADICATION, 1948
ST. JOE OPERATION

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
First	Cutover	1940-44	346	910	39,329	2.63	114
	Cutover	1920-39	207	162	7,943	.78	38
	Reproduction	1910-39	67	26	333	.39	5
	Stream (1)		18	28	12,505	1.56	695
	Total		638	1,126	60,110	1.76	94
Second	Reproduction (2)	1910-39	1,866	2,760	240,294	1.48	129
	Pole		10,591	4,137	119,791	.39	11
	Mature		513	423	16,032	.82	31
	Miscellaneous		109	687	31,602	6.30	290
	Stream		294	658	27,322	2.24	93
	Total		13,373	8,665	435,041	.65	33
Third	Cutover	1920-39	291	278	5,336	.96	18
	Reproduction	1910-39	1,832	1,869	22,911	1.02	13
	Pole		2,221	1,757	14,182	.79	6
	Miscellaneous		49	5	4	.10	1
	Stream		696	564	22,849	.81	33
	Total		5,089	4,473	65,282	.88	13
GRAND TOTAL			19,100	14,264	560,433	.75	29

Chemical work included above:

Stream			Upland		
Acres	Man-Days	Gallons Spray	Acres	Man-Days	Gallons Spray
(1) 10	26	1,233	(2) 21	78	137

TABLE 4

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1948
ST. JOE OPERATION

State	Working	Class	Acres	Man-Days	Ribes	Gallons Spray	Per Acre	
							Man-Days	Ribes
Idaho	First	EQ-Coop.	165	66	2,667		.40	16
		FS-Reg.	473	1,060	57,443	1,233	2.24	121
		Total	638	1,126	60,110	1,233	1.76	94
	Second	EQ-Coop.	3,524	2,363	234,410	137	.67	67
		FS-Reg.	9,849	6,302	200,631		.64	20
		Total	13,373	8,665	435,041	137	.65	33
	Third	EQ-Coop.	1,543	955	15,612		.62	10
		FS-Reg.	3,546	3,518	49,670		.99	14
		Total	5,089	4,473	65,282		.88	13
	All Workings	EQ-Coop.	5,232	3,384	252,689	137	.65	48
		FS-Reg.	13,868	10,880	307,744	1,233	.78	22
Total		19,100	14,264	560,433	1,370	.75	29	

TABLE 5
OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1948
ST. JOE OPERATION

State	Working	Acres Worked																
		By Forest Service					By Bureau of Entomology and Plant Quarantine					Total						
		National Forest	Public Domain	State	Private	Total	National Forest	Public Domain	State	Private	Total	Federal		Other			Total	
												National Forest	Public Domain	State	Private	Total		
Idaho	First	174		28	271	473			39	126	165	174		67	397	464	638	
	Second	7,758		586	1,505	9,849	40	80	1,228	2,176	3,524	7,798	80	1,814	3,681	5,495	13,573	
	Third	2,292	330	21	903	3,546	283	11	308	941	1,543	2,575	341	329	1,844	3,173	5,089	
	Total	10,224	330	635	2,679	13,868	325	91	1,575	3,243	5,232	10,547	421	2,210	5,922	8,132	19,100	

TABLE 6
RIBES SPECIES ERADICATED, 1948
ST. JOE OPERATION

Working	Eradication Type	Acres	Ribes Species				Total Ribes
			Ribes lacustre	Ribes viscosissimum	Ribes petiolare	Ribes inerme	
First	Cutover (1940-44)	346	17,936	21,393			39,329
	Cutover (1920-39)	207	5,231	2,712			7,943
	Reproduction (1910-39)	67	112	221			333
	Stream	18	12,480	25			12,505
	Total	638	35,759	24,351			60,110
Second	Reproduction (1910-39)	1,866	30,221	210,073			240,294
	Pole	10,591	69,775	50,016			119,791
	Mature	513	5,162	10,870			16,032
	Miscellaneous	109	1,080	30,522			31,602
	Stream	294	26,975	330	17		27,322
Third	Total	13,373	133,213	301,811	17		435,041
	Cutover (1920-39)	291	5,021	315			5,336
	Reproduction	1,832	19,394	3,449	68		22,911
	Pole	2,221	11,459	2,083	620	20	14,182
	Miscellaneous	49	1		3		4
All Workings	Stream	696	18,853	2,352	1,588	56	22,849
	Total	5,089	54,728	8,199	2,279	76	65,282
	Cutover (1940-44)	346	17,936	21,393			39,329
	Cutover (1920-39)	498	10,252	3,027			13,279
	Reproduction (1910-39)	3,765	49,727	213,743	68		263,538
All Workings	Pole	12,812	81,234	52,099	620	20	133,973
	Mature	513	5,162	10,870			16,032
	Miscellaneous	158	1,081	30,522	3		31,606
	Stream	1,008	58,308	2,707	1,605	56	62,676
	Total	19,100	223,700	334,361	2,296	76	560,433

TABLE 7

SUMMARY OF RIBES ERADICATION, 1929-1948
ST. JOE OPERATION

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Cutover	1945-49							5,922
	Plantation	1940-44	2,209	4,763	1,092,843	2.16	495	2,209	
	Cutover	1940-44	654	1,131	54,059	1.73	83	654	34,587
	Cutover	1920-39	16,498	11,543	3,604,682	.70	218	16,498	156,691
	Reproduction	1910-39	218,019	241,313	81,169,102	1.11	372	217,812	104,636
	Pole		86,838	33,082	7,780,055	.38	90	86,750	18,516
	Mature		177,162	68,756	17,998,538	.39	102	116,520	85,906
	Miscellaneous		2,652	2,297	767,429	.87	289	2,652	
	Stream (1)		35,572	97,396	23,394,136	2.74	658	35,572	
	Total		539,604	460,281	135,860,844	.85	252	478,667	406,258
Second	Plantation	1940-44	1,198	1,207	57,827	1.01	48	1,198	
	Cutover	1920-39	7,684	8,519	549,431	1.11	72	7,684	
	Reproduction (4)	1910-39	86,359	102,959	9,452,512	1.19	109	86,359	
	Pole		49,094	26,551	1,463,884	.54	30	49,006	
	Mature		9,478	7,254	837,751	.77	88	8,568	
	Miscellaneous		540	730	34,169	1.35	63	540	
	Stream (2)		13,145	28,624	5,241,992	2.18	399	13,145	
	Total		167,498	175,844	17,637,566	1.05	105	166,500	
Third	Plantation	1940-44	518	929	18,214	1.79	35	518	
	Cutover	1920-39	6,343	4,397	83,094	.69	13	6,343	
	Reproduction	1910-39	33,608	53,085	1,066,782	1.58	32	33,608	
	Pole		12,040	7,684	129,754	.64	11	12,040	
	Mature		170	325	38,042	1.91	224	170	
	Miscellaneous		49	5	4	.10	1	49	
	Stream (3)		11,076	17,690	1,854,039	1.60	167	11,076	
	Total		63,804	84,115	3,189,929	1.32	50	63,804	
GRAND TOTAL			770,906	720,240	156,688,339	.93	203	708,971	

Chemical work included above:

Stream			Upland		
Acres	Man-Days	Gallons Spray	Acres	Man-Days	Gallons Spray
(1) 7,494	21,904	672,806	(4) 21	78	137
(2) 3,327	4,858	113,162			
(3) 3,246	3,571	28,570			

TABLE 8

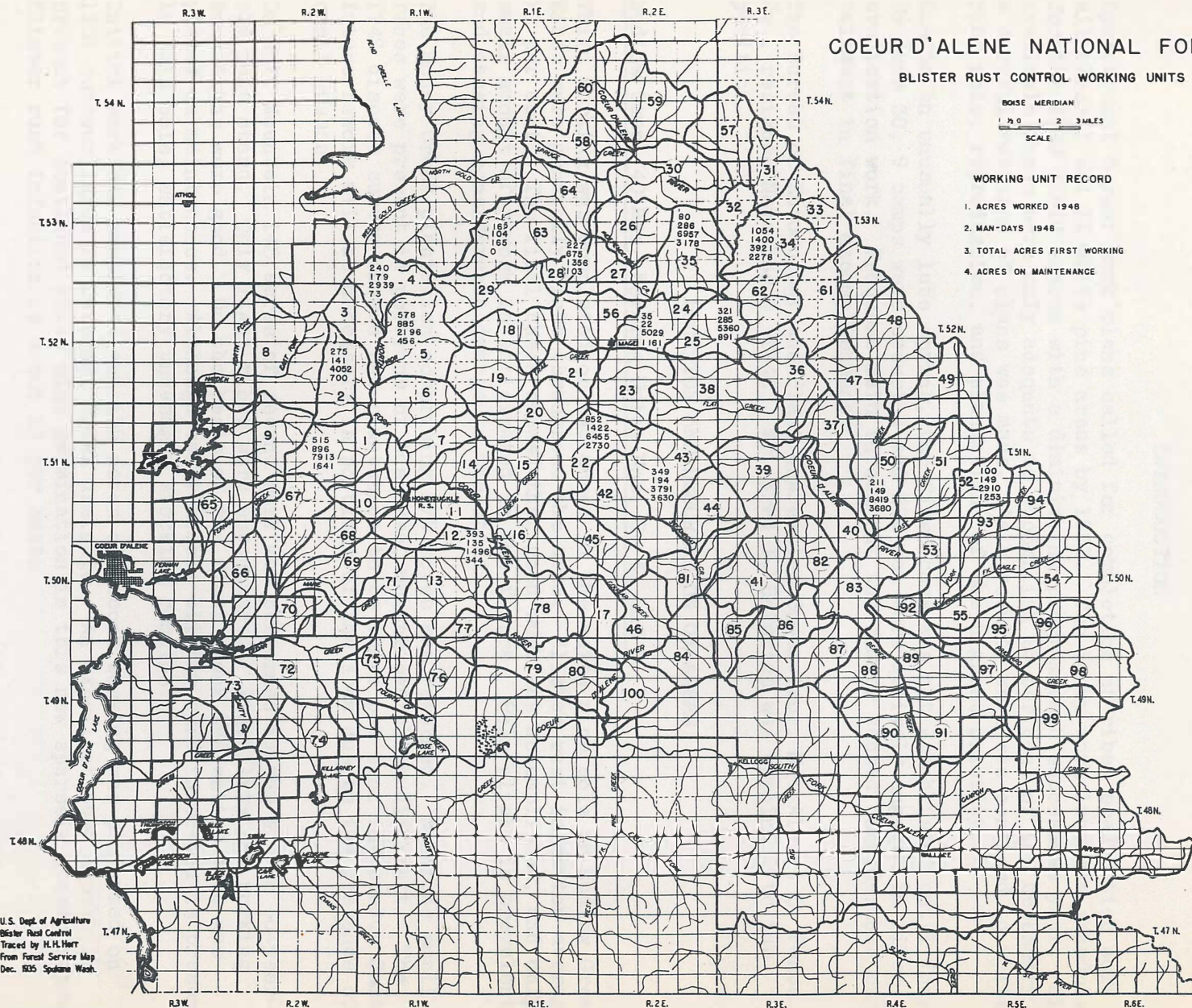
SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1929-1948
ST. JOE OPERATION

State	Class	Gross Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
						Man-Days	Ribes
Idaho	EQ-Coop.	60,375	51,437	5,274,436	65,081	.85	87
	EQ-Emerg.	234,519	157,898	43,593,387	77,088	.67	186
	FS-Reg.	212,789	240,422	35,597,107	322,324	1.13	167
	FS-Emerg.	70,981	45,138	15,333,106	101,476	.64	216
	CCC	192,242	225,345	56,890,303	248,706	1.17	296
	Total	770,906	720,240	156,688,339	814,675	.93	203

TABLE 9

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1929-1948
ST. JOE OPERATION

State	Ownership	Net Acres in Control Area					
		Acres Worked				Acres Unworked	Total Acres
		First	Second	Third	Total		
Idaho	National Forest	215,755	91,614	35,335	342,704	97,946	313,701
	Public Domain	12,458	5,411	2,649	20,518	12,637	25,095
	Subtotal Federal	228,213	97,025	37,984	363,222	110,583	338,796
	State	58,186	21,904	6,797	86,887	57,083	115,269
	Private	192,268	47,571	19,023	258,862	238,592	430,860
	Subtotal Other	250,454	69,475	25,820	345,749	295,675	546,129
	Total	478,667	166,500	63,804	708,971	406,258	884,925



BLISTER RUST CONTROL, COEUR D'ALENE OPERATION, 1948

By

A. L. Pence, Jr., Operation Supervisor, Bureau of Entomology and Plant Quarantine
C. J. Pederson, Forest Officer, U. S. Forest Service

INTRODUCTION

Operational 5-year work plans called for completion of ribes eradication work on all class I and II white pine areas by 1953. The heavy work load was scheduled for the 1948 field season with a diminishing program each successive year. Since available funds were only adequate to accomplish 25 per cent of the necessary work a careful revision of plans was made. As a result, work was confined to white pine pole, reproduction, and plantations of the highest priority.

Due to an unusually late spring, the first camp was not established until June 2. By June 30, 9 camps were occupied and 292 men were actively engaged in ribes eradication work. Frequent rain throughout the summer caused considerable curtailment in final accomplishment.

The Bureau of Entomology and Plant Quarantine Supervisor, Mr. Albert L. Pence, Jr., resigned November 3, 1948. Mr. Fred J. Heinrich was appointed to the position.

LOCATION AND DESCRIPTION OF AREAS

Hudlow Camp, 40-Man, Working Units Nos. 2, 4, and 5

Third working was completed on 245 acres in the white pine pole on Hudlow Creek. Ribes were generally light throughout the area. Blister rust infection averages 10 per cent. The final check showed that good work was accomplished, and only a small amount of rework is anticipated in the future. Pole blight is prevalent and causing considerable damage to the stand.

The Honey Creek plantation comprising 175 acres was reworked. Numerous small ribes were present in portions of the area, making searching difficult. The 1947 disease survey showed the plantation to be three per cent infected. Some future rework will be necessary in portions of the area due to the presence of small bushes.

On Colt Mountain 145 acres of second work was performed in the 41- to 60-year-old pole stand. Only light ribes were encountered. Visibility and working conditions were good. On the basis of the final check the entire area was placed on maintenance. Although considerable blister rust infection is present in this pole, satisfactory undamaged stocking remains.

Initial work was completed and 155 acres of second working was performed on 1937 cutover lands in Cataract Creek drainage. An excellent seed source is present for continued white pine germination in this now sparsely stocked area. Blister rust infection is about 10 per cent.

Heavy ribes concentrations in the stream type within the Moose and Iron Creek drainages were treated with Ammate applied as an aerial spray.

Additional work will be necessary in these three units before the maintenance objective is achieved.

Independence Creek Camp, 30-Man, Working Units Nos. 28 and 63

Second working was completed on 512 acres of white pine reproduction on Camp Creek. Initial work was performed on 253 acres in the recent plantation on lower Snowbird Creek. Unworked portions of the area will be treated chemically in 1949. Nearly 1,200 acres of natural white pine reproduction in this unit were previously worked to near maintenance standards. Blister rust infection averages only two per cent in the 1948 work area.

Jordan Creek Camp, 60-Man, Working Units Nos. 34 and 35

This work area comprises about 5,000 acres of thrifty, well-stocked white pine. Nearly the entire area is plantation, having been planted in 1925, 1926, 1927, and 1939. Initial work on the Upper Calamity Creek plantation was completed. Third working on the Lost Fork of Jordan and second working on West Elk Creek were completed.

Only 300 acres of plantation and natural reproduction on the East Fork of Alden Creek need reworking to place a large contiguous block of 2,000 acres on a maintenance basis. This work is planned for the 1949 field season.

Blister rust infection in these areas averages about five per cent.

Riley Creek Camp, 48-Man, Working Unit No. 22

Second working was performed on 852 acres of white pine reproduction and pole on Teepee Creek. This area comprises 6,000 acres of excellent reproduction and pole stands. Although over 2,000 acres are classified as being on maintenance, ribes eradication work is far behind schedule on the remaining area. No work had been done in this unit since 1934. Blister rust has damaged 16 per cent of the unprotected stand. Regardless of infection losses, the area still remains well stocked. Completion of the work planned during the next 3 years should bring the area to a maintenance basis.

Steamboat Camp, 10-Man, Working Unit No. 43

Initial work was completed in the 1943-44 cutover area on June Creek. Second working was continued on the Little East Fork of Steamboat Creek. Portions of the area supporting heavy ribes concentrations were treated with 2,4,5-T applied with Hi-Fog guns. Considerable infection is present in the June Creek drainage, but is very light in the East Fork of Steamboat Creek area.

Additional work will be required in 1949 to complete the area according to previous plans.

Breakwater Camp, 10-Man, Working Unit No. 12

Second working was completed on 360 acres of white pine reproduction near the mouth of Copper Creek. Heavy ribes concentrations at the mouth of Copper Creek

were treated with Ammate applied as an aerial spray.

This area supports a thrifty, well-stocked stand of reproduction, surrounded by white pine pole and mature. Blister rust infection is less than one per cent.

An excellent ribes eradication job was done this summer and the area now meets maintenance standards.

Lone Cabin Camp, 30-Man, Working Unit No. 1.

The 60-year-old white pine pole stand on Lost Mine Creek was worked to the maintenance standard. Third working was continued on the 1926 cutover area in Burnt Cabin Creek drainage. Blister rust damage is generally light on both of these areas.

Tentative plans call for occupancy of this camp in 1949, to complete the Burnt Cabin Creek area, and to take care of the needed work in the reproduction and pole stands in the Deception Creek drainage.

Shoshone Creek Camp, 10-Man, Working Units Nos. 50 and 52.

Second and third working was continued on Lower Clover, Bridge, and Loading Creeks. Third working was completed on 100 acres on lower Lost Creek and this area now meets the maintenance standard. Work area consisted of reproduction, which was established following the 1910 burn. Portions of the area support a very dense stand, making travel and searching difficult.

Blister rust infection was light on areas worked this year.

Drexall Springs Camp, 10-Man, Working Units Nos. 24 and 25.

Third working was completed on the 1940 Molly Creek plantation. This is part of a 5,000-acre block of white pine, 90 per cent being established by planting. This area is in a safe status, although spot work will be necessary for the next 10 years.

In Squeak Creek drainage, 35 acres of 1947 fill-in planting area were worked for the third time.

Blister rust infection on the pine is light in the Molly Creek plantation.

CONTROL STATUS

As a result of ribes eradication work, 95,955 acres, or 25 per cent of the work area within the control boundary, now meet the maintenance standards.

Due to inadequate ribes eradication programs during the past several years, serious loss has occurred in several white pine stands. Results of the 1948 stocking and disease survey indicate that 33 per cent damage has occurred in unprotected pole stands in the north fork of the Coeur d'Alene River block. This is based on 2,320 chains of survey strip run in working units Nos. 1, 2,

3, 5, 6, 10, and 12. Damage to unprotected pole stands in the Magee block averages 21 per cent based on 4,700 chains of survey strip run in working units Nos. 18, 20, 21, 22, and 23.

Results of a regular disease survey in young, natural white pine reproduction and plantations indicate that they are generally in satisfactory condition, and protection can be established before serious loss occurs.

WORKING METHODS

A training school for supervisory personnel was held at Hudlow during the last week of May. Complete instruction was given on all phases of ribes eradication work. Five superintendents were not available at this date and were given on-the-job training. All training of crewmen was conducted by two organized teams, using training charts and the system outlined in the training manual. Training was conducted on the basis of two-man crews initially and work was continued under this system until the middle of July, at which time drag lines were available. After this date, the one-man method was used almost exclusively for hand ribes eradication.

The one-man method using drag lines did not receive a good trial this year due to two reasons: (1) The season was too far advanced before introduction. Crews were already leaving the job by the time materials arrived. (2) The organization developed to supervise the early season work did not lend itself readily to the new system. Results obtained show that the drag line method has excellent possibilities and will be used throughout the operation next year.

Ammate was used on all stream type ribes. Knapsack sprayers were used in most instances, although the mobile power units were used wherever possible.

Both dry Ammate and liquid 2,4-D were used on decapitated bushes. A small amount of 2,4,5-T was applied from Hi-Fog units on part of the Steamboat sale area.

Four of the nine camps were small 10-man units. This size crew proved to be very efficient and easily managed. The production was consistently greater and efficiency higher than obtained in the larger camps.

CHECKING AND SURVEYS

Because of the volume of post check and disease survey which had been scheduled, a training program was held to develop new checking and survey personnel. Twenty men were selected from camp crews to attend a 10-day training school. Sixteen of these men were promoted to checkers upon satisfactory completion of this training. The checker training charts were found to be useful in conducting this school.

Standard checking procedures were used on all areas worked by eradication crew methods. On areas worked using the drag line method all work lanes were checked. The checker ran an 8-foot width meandering traverse between lane boundaries and each strip was tied in at the 5-chain tags. This checking method worked very satisfactorily as the checker could concentrate on searching without the interference of pacing and compass work.

All necessary regular checking was completed. A post check survey was conducted on 7,242 acres of natural reproduction and plantations in the locations listed below.

POST CHECK 1948

<u>Working Unit Number</u>		<u>Drainage</u>	<u>Acres Checked</u>
22	Tepee Creek	Short Creek	325
		Riley Creek	325
10	Deception	Sands Creek	297
4	Honey Creek	Frog Creek	203
3	Tom Lavin	Tom Lavin Creek	293
		Llewelling Creek	334
5	Iron Creek	Solitaire Creek	291
2	Hudlow Creek	Middle Fork Hudlow	254
50	Shoshone	Loading Bridge and Clover Creek	1,020
25	Brett Creek	Vice President, President, New Deal, Brett Creek	1,840
31	Alden Creek	E. F. Alden Creek	500
32	Cathedral	E. Cathedral Pk. and Ethel Creek	1,050
20	Big Elk	Big Elk Creek	<u>510</u>
			7,242

STATEMENT OF EXPENDITURES AND COSTS

The statement of expenditures is shown in the following tables by the cooperative agency and the type of appropriation.

TABLE 1

EXPENDITURES BY APPROPRIATIONS, CALENDAR YEAR 1948 COEUR D'ALENE OPERATION

Cooperating Agency	Appropriation	Amount
Bureau of Entomology and Plant Quarantine	Regular BLR-1-4	\$ 3,317.39
Forest Service	Regular BLR-4	200,069.60
Total		<u>\$203,386.99</u>

TABLE 2

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1948
COEUR D'ALENE OPERATION

Item	Bureau of Entomology and Plant Quarantine	Forest Service	Total
	Regular BLR-1-4	Regular BLR-4	
Sal. perm. men	\$3,127.84	\$ 10,383.12	\$ 13,510.96
Sal. temp. men		9,111.41	9,111.41
Wages, temp. labs.		118,902.24	118,902.24
Subs. supplies		40,312.29	40,312.29
Equipment		799.02	799.02
Travel and Transp.	189.55	6,610.99	6,800.54
Other Supplies		13,950.53	13,950.53
Total	\$3,317.39	\$200,069.60	\$203,386.99

TABLE 3

SUMMARY OF RIBES ERADICATION, 1948
COEUR D'ALENE OPERATION

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
First	Plantation	1945-49	253	175	23,466	.69	93
	Cutover	1940-44	315	176	2,280	.56	7
	Cutover	1920-39	155	316	42,484	2.04	274
	Reproduction	1910-39	304	476	11,027	1.57	36
	Mature		31	27	3,546	.97	114
	Stream (1)		34	215	21,919	6.32	645
	Total		1,092	1,385	104,722	1.27	96
Second	Cutover	1940-44	34	18	241	.53	7
	Cutover	1920-39	63	79	6,041	1.25	96
	Reproduction	1910-39	1,388	2,069	57,170	1.49	41
	Pole		759	872	18,664	1.15	25
	Mature		181	149	10,048	.82	56
	Stream (2)		161	458	58,592	2.84	364
	Total		2,586	3,645	150,756	1.41	58
Third	Plantation	1940-44	381	393	12,096	1.03	32
	Cutover	1920-39	207	479	16,889	2.31	82
	Reproduction	1910-39	474	423	8,284	.89	17
	Pole		553	488	7,008	.88	13
	Mature		84	59	5,331	.70	63
	Stream (3)		18	50	3,370	2.78	187
	Total		1,717	1,892	52,978	1.10	31
GRAND TOTAL			5,395	6,922	308,456	1.28	57

Chemical work included above:

	Acres		Gallons	
	Man-Days	Spray		
(1)	34	215	3093	
(2)	161	458	9375	
(3)	18	50	337	

TABLE 4

RIBES SPECIES ERADICATED, 1948
COEUR D'ALENE OPERATION

Working	Eradication Type	Acres	Ribes Species			Total Ribes
			Ribes lacustre	Ribes viscosissimum	Ribes inerme	
First	Plantation (1945-49)	253	23,459	7		23,466
	Cutover (1940-44)	315	855	1,425		2,280
	Cutover (1920-39)	155	41,929	555		42,484
	Reproduction (1910-39)	304	4,243	6,784		11,027
	Mature	31	3,507	39		3,546
	Stream	34	21,919			21,919
	Total	1,092	95,912	8,810		104,722
Second	Cutover (1940-44)	34	91	150		241
	Cutover (1920-39)	63	6,038	3		6,041
	Reproduction (1910-39)	1,388	54,457	2,713		57,170
	Pole	759	18,652	12		18,664
	Mature	181	10,028	20		10,048
	Stream	161	53,728		4,864	58,592
	Total	2,586	142,994	2,898	4,864	150,756
Third	Plantation (1940-44)	381	8,482	3,614		12,096
	Cutover (1920-39)	207	16,163	726		16,889
	Reproduction (1910-39)	474	3,630	4,650	4	8,284
	Pole	553	6,482	526		7,008
	Mature	84	5,253	78		5,331
	Stream	18	3,339	31		3,370
	Total	1,717	43,349	9,625	4	52,978
All Workings	Plantation (1945-49)	253	23,459	7		23,466
	Plantation (1940-44)	381	8,482	3,614		12,096
	Cutover (1940-44)	349	946	1,575		2,521
	Cutover (1920-39)	425	64,130	1,284		65,414
	Reproduction (1910-39)	2,166	62,330	14,147	4	76,481
	Pole	1,312	25,134	538		25,672
	Mature	296	18,788	137		18,925
	Stream	213	78,986	31	4,864	83,881
	Total	5,395	282,255	21,333	4,868	308,456

TABLE 5

SUMMARY OF RIBES ERADICATION, 1927-1948
COEUR D'ALENE OPERATION

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Plantation	1945-49	968	578	33,013	.60	34	968	
	Burn	1940-44	716	351	53,652	.49	75	716	
	Plantation	1940-44	992	1,920	465,201	1.94	469	992	227
	Cutover	1940-44	632	508	64,145	.80	101	632	10,136
	Cutover	1920-39	16,575	21,885	5,424,939	1.32	327	16,575	19,034
	Reproduction	1910-39	90,868	140,227	20,737,854	1.54	228	89,045	9,634
	Pole		65,893	31,279	4,482,605	.47	68	65,157	9,538
	Mature		141,127	87,756	13,801,904	.62	98	123,110	7,359
	Miscellaneous		13,333	16,695	2,965,945	1.25	222	12,909	304
	Stream (1)		14,909	58,044	11,846,082	3.89	795	14,801	2,614
	Total		346,013	359,243	59,875,340	1.04	173	324,905	58,846
Second	Plantation	1940-44	618	1,529	130,960	2.47	212	618	
	Cutover	1940-44	34	18	241	.53	7	34	
	Cutover	1920-39	9,452	13,447	1,975,736	1.42	209	9,452	
	Reproduction	1910-39	23,430	35,990	2,059,749	1.54	88	22,697	
	Pole		5,600	4,008	506,189	.72	90	5,600	
	Mature		10,363	8,266	823,509	.80	79	10,063	
	Miscellaneous		1,585	2,963	358,052	1.87	226	1,585	
	Stream (2)		8,148	15,107	1,641,564	1.85	201	8,040	
	Total		59,230	81,328	7,496,000	1.37	127	58,089	
Third	Plantation	1940-44	894	1,312	63,271	1.47	71	894	
	Cutover	1920-39	4,893	9,135	441,730	1.87	90	4,893	
	Reproduction	1910-39	5,478	8,409	319,023	1.54	58	4,889	
	Pole		1,737	1,561	79,873	.90	46	1,737	
	Mature		2,008	1,477	83,852	.74	42	2,008	
	Miscellaneous		61	72	3,569	1.18	59	61	
	Stream (3)		1,732	3,022	150,736	1.74	87	1,714	
	Total		16,803	24,988	1,142,054	1.49	68	16,196	
	GRAND TOTAL		422,046	465,559	68,513,394	1.10	162	399,190	

Chemical work included above:

	Acres	Man-Days	Gallons Spray
(1)	34	272	3,296
(2)	345	820	10,792
(3)	95	207	872

TABLE 6

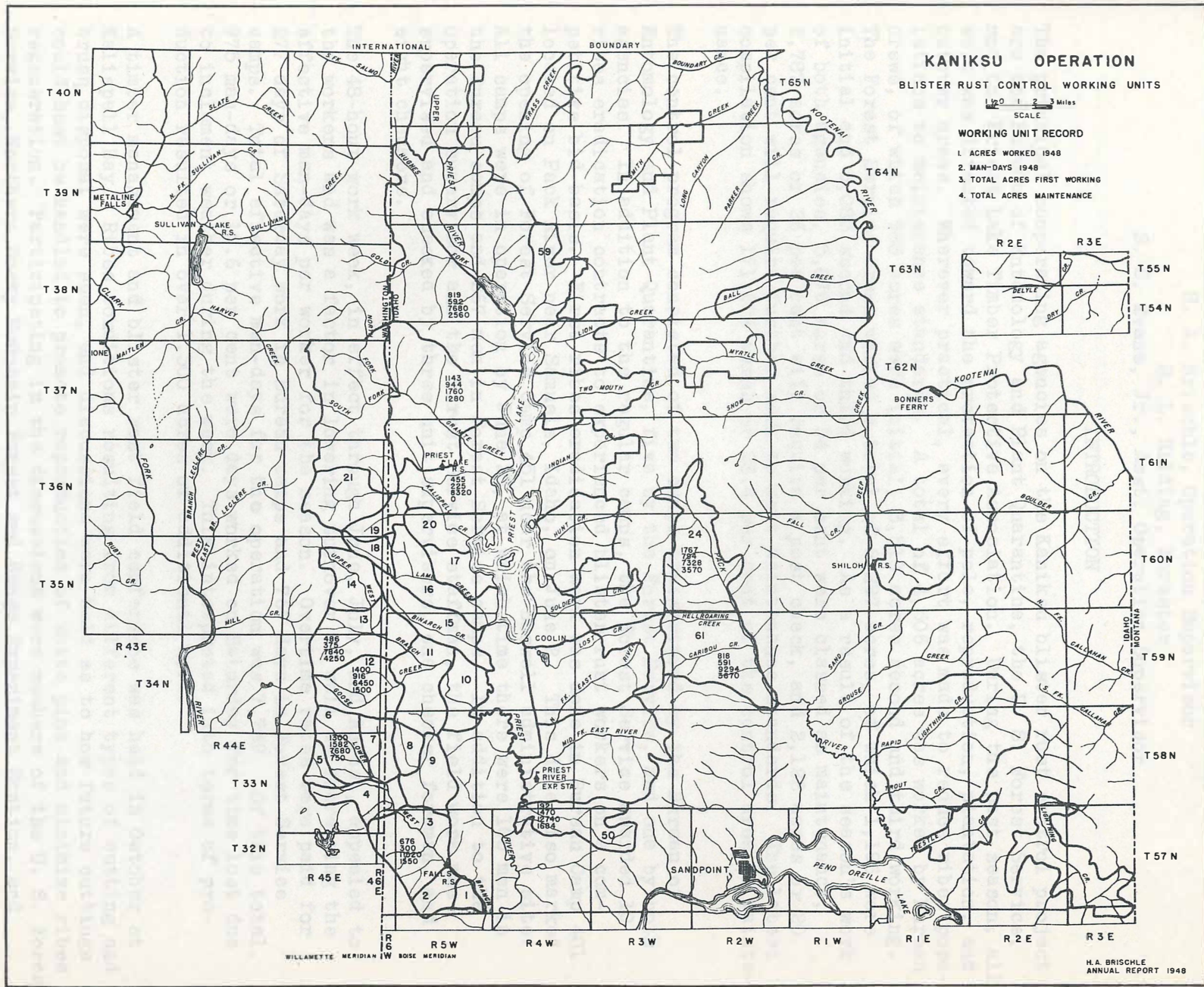
SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1927-1948
COEUR D'ALENE OPERATION

State	Class	Acres	Man-Days	Ribes	Gallons Spray	Per Acre	
						Man-Days	Ribes
Idaho	EQ-Reg.	25,776	8,351	2,846,383		.32	110
	EQ-Emerg.	41,039	35,541	6,589,217		.87	161
	FS-Reg.	95,168	114,690	15,305,052	14,960	1.21	161
	FS-Emerg.	111,711	86,897	17,620,173		.78	158
	FS-Cont.	81	78	7,110		.96	88
	CCC	148,271	220,002	26,145,459		1.48	176
	Total	422,046	465,559	68,513,394	14,960	1.10	162

TABLE 7

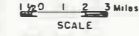
OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1927-1948
COEUR D'ALENE OPERATION

State	Ownership	Net Acres in Control Area					
		Acres Worked				Acres Unworked	Total Acres
		First	Second	Third	Total		
Idaho	National Forest	308,761	55,736	16,067	380,564	51,895	360,656
	State	5,427	440	45	5,912	711	6,138
	Private	10,717	1,913	84	12,714	6,240	16,957
	Subtotal Other	16,144	2,353	129	18,626	6,951	23,095
	Total	324,905	58,089	16,196	399,190	58,846	383,751



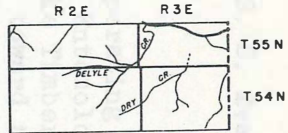
KANIKSU OPERATION

BLISTER RUST CONTROL WORKING UNITS



WORKING UNIT RECORD

- 1. ACRES WORKED 1948
- 2. MAN-DAYS 1948
- 3. TOTAL ACRES FIRST WORKING
- 4. TOTAL ACRES MAINTENANCE



BLISTER RUST CONTROL, KANIKSU OPERATION, 1948

By

H. A. Brischle, Operation Supervisor

R. L. Hilding, Forester

S. S. Evans, Jr., Asst. Operation Supervisor

INTRODUCTION

The principal cooperating agencies on the Kaniksu blister rust control project are the Bureau of Entomology and Plant Quarantine, the U. S. Forest Service, and the Priest Lake Timber Protective Association. During the past season, all work was directed toward the protection of pole, reproduction, plantation, and cutover areas. Wherever practical, every effort was made to reduce ribes populations to maintenance standards. A total of 4,506 acres was worked by Bureau crews, of which 988 acres were initial, 3,518 acres second and third working. The Forest Service crews worked a total of 6,297 acres, of which 1,196 were initial and 5,083 second and third working. As a result of the season's work of both agencies, 5,876 acres or 54 per cent were classed as maintenance, 2,787 acres or 26 per cent will require a post check, and 2,122 acres or 20 per cent will require further work to meet maintenance standards. The latest compilation shows 171,624 acres or 28.4 per cent of the control area on maintenance.

The control program consisted of two camps administered by the Bureau of Entomology and Plant Quarantine, five by the Forest Service, and one by both agencies. In addition to the regular camps, the Forest Service awarded 10 ribes eradication contracts to experienced blister rust workers on a competitive bid basis. First ribes eradication work was done in Bureau Camp 401 located on Pack River near Samuels, Idaho, on June 2. This date also marked the opening of Forest Service Camp 451 near the Boswell administrative site. All camps were in operation by June 20, at which time there were 100 men in the Bureau camps and 267 men in Forest Service camps. In addition to the operation supervisor and the Forest Service staffman, the field work was supervised and checked by three unit supervisors, one checker foreman, and eight checkers.

The 48-hour work week, in effect through June, July, and August, appealed to the workers and was a factor in lowering turnover as well as increasing the effective man-days per worker for the season. Overtime rates were paid for 277 days of Saturday work in Bureau camps and 767 days in Forest Service camps. Total effective man-days for the operation was 7,789. Of this total, 975 man-days or 12.6 per cent were days worked on Saturday for time lost due to inclement weather during the week. This interpreted into terms of production resulted in over 1,300 acres of additional work.

A timber management and blister rust field conference was held in October at Kalispell Bay. Ribes conditions resulting from different types of cutting and brush disposal were seen, and discussions were held as to how future cuttings could best be handled to promote reproduction of white pine and minimize ribes regeneration. Participating in the discussions were members of the U. S. Forest Service, Northern Rocky Mountain Forest and Range Experiment Station, and Bureau of Entomology and Plant Quarantine.

On October 15, Kermit Miller resigned as Forest Service blister rust staffman. Ray L. Hilding, former District Ranger who was in charge of disease survey, was assigned to this position.

METHODS AND TRAINING

All Bureau camps and one Forest Service camp were trained in the use of the one-man drag line method. The remainder of the Forest Service camps was trained in three-man crews because of a shortage of drag lines. Late in the season, when lines were available, all camps were organized to use the one-man method. This method was particularly advantageous where ribes concentrations were scattered, since able crewmen could take advantage of this condition and speed up production without lowering efficiency. The method also developed sufficient individual responsibility in many workers so that late in the season they were able to work effectively alone without the immediate supervision of a straw boss.

Valuable assistance was obtained throughout the season from the methods project in the proper method and use of chemical equipment. A truck-mounted high pressure sprayer using ammonium sulfamate (Ammate) was used on heavy ribes concentrations accessible by roads. Less accessible places were treated with portable power sprayers, knapsack units, and Hi-Fog guns. Promising results were obtained with Hi-Fog units using 2,4,5-T on concentrations of large Ribes lacustre and R. viscosissimum in the upper Kalispell Creek drainage.

Contract ribes eradication work was done extensively for the first time on the operation. Supervisory personnel were largely responsible for stimulating interest in contract ribes eradication work. When the camps were closed in August, several camp superintendents, foremen, and checkers, as well as a number of laborers, were willing to try contract jobs. The areas offered bidders were 10- to 20-year-old reproduction, 40- to 60-year-old pole, and one area cut over in 1940. The areas represented second and third working and varied in size from 71 to 177 acres. The bid prices ranged from \$8.50 to \$22.00 per acre. The average for all contracts was \$12.24 per acre. Administration costs, including checking and car mileage, amounted to \$1.20 per acre, bringing the average cost to \$13.45 per acre. Contractors were required to use the drag line method. They completed 830 acres. Two contractors who had to return to school were unable to finish their areas and were granted extensions until June 30, 1949. For the completed areas, the contractors used .55 man-day per acre and removed an average of 10 ribes per acre. All areas approved for payment were worked to contract specifications and as a result 750 acres or 90 per cent were placed on maintenance.

Administrative detail necessary for the awarding of ribes eradication contracts and payments to contractors was handled by the Forest Service office at Sandpoint, Idaho. Two men were required to establish the area boundaries and check the work on completed contracts. Contract work was confined to areas of relatively light ribes populations, but from the results obtained, it appears that contracts can be awarded on any area regardless of working conditions. A number of contracts have already been awarded for 1949 work.

CHECKING AND SURVEYS

A crew of seven Forest Service and two Bureau checkers under the supervision of a checker foreman did all the necessary current and post check work. On upland areas worked by the one-man method, a sample random strip was run in each $2\frac{1}{2}$ -chain crew lane. Likely ribes sites within each lane were scouted. By this method, it is estimated that at least 15 per cent of the ground was inspected and it was possible to keep a close check behind each worker and thus reduce rework to a minimum. Checking on all chemical work was deferred until 1949.

An eight-man crew worked from July 1 to October 15 to secure data on blister rust damage, species composition, age classes, and stocking. These data are being used to evaluate all white pine growing units so that priorities can be established for future blister rust control work. Extensive data were secured on 16 units in the Priest Lake drainage as well as on units in Pack River and Smalle, Winchester, Tenmile, Tacoma, Trestle, Trail, Dodge, and Twin Creeks. It is estimated the survey is complete on 50 per cent of the areas. Additional work will be necessary in 1949 to complete the job. The data have not been completely summarized and no definite conclusions can be made at this time. Preliminary figures show loss from blister rust varying from 5.9 per cent of the stocked white pine quadrats in Binarch Creek to 26 per cent of the stocked white pine quadrats in Granite Creek.

LOCATION AND DESCRIPTION OF AREAS

Bureau Camp 401.

Located on Pack River, near Samuels, Idaho. The objective was to complete the necessary rework on high priority white pine areas in Caribou Creek, Hell Roaring Creek, Lindsey Creek, and Youngs Creek. With this accomplished, no work is contemplated in the Pack River drainage for two to three years. It may then be necessary to do initial work on several recently cutover areas.

The season's work included 790 acres of second and third working in reproduction and pole stands on lower Caribou Creek; 515 acres of reproduction were worked between Hell Roaring and Lindsey Creeks, as well as 782 acres of first work and 466 acres of second work between Youngs Creek and McCormick Creek. A total of 2,557 acres was worked, of which 1,982 acres or 78 per cent were placed on maintenance, 455 acres or 18 per cent show need of a post check, and 120 acres or 4 per cent will require rework.

Bureau Camp 402.

Located in the vicinity of Sandpoint Baldy and near the headwaters of Big Creek. The objective was to rework areas of cutover and adjacent pole stands. Most of the area has now been worked for the fourth time. This area has presented a ribes control problem since it was cut over about 10 years ago. Due to conditions following logging, ribes have persisted in the dense ground cover. A total of 1,821 acres was worked and 104 ribes per acre removed. Of this acreage, 891 acres or 49 per cent were placed on maintenance, 685 acres or 38 per cent will require a post check, and 245 acres will need to be reworked.

Forest Service Camp 400.

Located at Blister Rust Control Headquarters, Kalispell Bay. In July, this crew and equipment were moved to Forest Service Camp 451. This unit consisted of six men working as a mobile crew and used knapsack sprayers and portable power units as well as a high pressure truck-mounted sprayer. Chemicals used were ammonium sulfamate (Ammate), 2,4-D, and 2,4,5-T, which was available after July.

Ammate was used on 91 acres of cutover and adjacent stream type on lower Lamb Creek early in the spring. Continued rainy weather was detrimental to this work and part of the area will have to be reworked in 1949. On Blickensderfer Creek, 39 acres of cutover were treated with Ammate, using a portable power sprayer. In the cut over portions of the Goose Creek drainage, 28 acres were sprayed with Ammate, and 55 acres supporting numerous 2- to 4-year-old *R. viscosissimum* bushes were treated with 2,4-D; another 28-acre area was treated with 2,4,5-T. Chemical areas will be checked in 1949. A late fall inspection indicated favorable results on the areas where 2,4-D and 2,4,5-T were used.

Forest Service Camp 451.

Located near the Boswell administrative site. Cutover areas were worked in the lower West Branch and the South Baldy plantation. The South Baldy area was originally burned in 1938. Standing snags were cut and the area was control burned in the fall of 1945. It was planted to white pine and Douglas fir in the spring of 1948. The protection of this plantation is a problem of removing mature ribes bushes from the unburned brush around the planting and ribes seedlings from the newly planted area. This was done during the past season. A total of 1,101 acres was worked, of which 545 were first work and 656 second and third work.

Forest Service Camp 452.

Located at the Pelke administrative site on the Upper West Branch. The objective was to work stream type adjacent to pole stands along the Upper West Branch as well as recent cutover areas in that vicinity.

A total of 1,744 acres was worked, consisting of 73 acres of first work and 1,621 acres of second and third work. Since most of the work was in stream type and younger age classes, only 640 acres or 37 per cent of the area worked could be placed on maintenance.

Forest Service Camp 453.

Located on Fedar Creek, a tributary of Granite Creek. This crew worked the Fedar Creek plantation and continued the work of 1947 on the stream type of main Granite Creek to protect adjacent pole stands.

In addition to ribes eradication, a crew of five men did pruning and canker elimination work in the plantation. The lower third of branches was removed from all trees, thus eliminating branch cankers and improving the quality of lower wood as well. A total of 98 man-days or 0.59 man-day per acre was used to prune 40,000 trees in the 165-acre plantation.

The crews covered 1,273 acres of second and third work. As a result of the working, 784 acres or 62 per cent including the plantation were placed on maintenance, 350 acres or 28 per cent show need of a post check, and 139 acres will need rework.

Forest Service Camp 454

Camp 454 was located on the Thorofare between Upper and Lower Priest Lakes, and was administered by the Forest Service and Bureau. Objective of the Forest Service was to perform a final working on 50-year-old pole and 20-year-old reproduction stands on Armstrong Creek and Plowboy Mountain. Bureau men reworked stream type along the Thorofare and Caribou Creek.

Due to bad weather in the early part of the season, this camp lost considerable time in the field and did not complete the work assigned. Plans are made to put a small 10- to 15-man camp in this area to remove heavy ribes concentrations on Plowboy Mountain.

Forest Service crews worked a total of 659 acres of which 552 or 85 per cent were put on maintenance, 107 or 16 per cent show need of a post check. The 128 acres of stream type worked by Bureau crews was put in post check status.

Forest Service Camp 455

A pack camp located on the headwaters of Kalispell Creek between Hungry Mountain and Kalispell Rock. This camp was organized for using Hi-Fog spray equipment and consisted of a foreman, a cook, and 13 men in the field, which proved to be an efficient unit. Hi-Fog equipment using 2,4,5-T was used on heavy ribes concentrations in brush patches above planted areas in the Kalispell Creek drainage. Areas worked were unburned in the 1939 fire. Heavy brush and windfalls made it a difficult area to work by any other method than the one used. The 2,4,5-T chemical was not available until the third week in July; as a result the job was not completed. It is planned to continue the work in 1949 pending the outcome of the effectiveness of the chemical. Areas worked this season will be checked as early as possible in the spring of 1949. A late season inspection indicated a kill of many bushes.

First work was performed on 231 acres at the rate of .50 man-day per acre; 259 ribes per acre were treated. Second and third working were performed on 224 acres at the rate of .73 man-day per acre; 91 ribes per acre were treated.

STATEMENT OF EXPENDITURES AND COSTS

The statement of expenditures and costs is shown in the following tables by cooperative agency and the type of appropriation:

TABLE 1

EXPENDITURES BY APPROPRIATIONS, CALENDAR YEAR 1948 KANIKSU OPERATION

Cooperating Agency	Appropriation	Amount
Bureau of Entomology and Plant Quarantine	Regular BLR-1-4	\$ 17,564.12
	Regular BLR-3-4	37,188.09
	Subtotal	\$ 54,752.21
State of Idaho	State BLR-3-4	\$ 3,607.13
Priest Lake Timber Protective Association	Private BLR-3-4	4,055.00
	Subtotal	\$ 7,662.13
Forest Service	Regular BLR-4	\$184,279.44
Total		\$246,693.78

TABLE 2
CLASSIFIED EXPENDITURES, CALENDAR YEAR 1948
KANIKSU OPERATION

Item	Bureau of Entomology and Plant Quarantine				Forest Service	Total
	Regular BLR-1-4	Regular BLR-3-4	State and Private BLR-3-4	Total	Regular BLR-4	
Contract ribes erad.					\$ 10,945.50	\$ 10,945.50
Sal. perm. men	\$10,191.26	\$ 3,638.84		\$13,830.10	20,963.80	34,793.90
Sal. temp. men	505.30	5,940.01	\$1,065.53	7,510.84	9,921.58	17,432.42
Wages temp. labs.	2,218.70	22,545.14	6,596.60	31,360.44	80,690.36	112,050.80
Subs. supplies	1,056.25	3,225.42		4,281.67	31,440.64	35,722.31
Equipment		47.12		47.12	3,458.32	3,505.44
Trucks					4,304.54	4,304.54
Travel and transp.	1,025.80	1,419.26		2,445.06	1,463.84	3,908.90
Other supplies	2,566.81	372.30		2,939.11	21,090.86	24,029.97
Total	\$17,564.12	\$37,188.09	\$7,662.13	\$62,414.34	\$184,279.44	\$246,693.78

TABLE 3

SUMMARY OF RIBES ERADICATION, 1948
KANIKSU OPERATION

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
First	Cutover	1945-49	281	368	68,517	1.31	244
	Cutover (3)	1940-44	596	617	152,635	1.04	256
	Cutover	1920-39	50	127	17,740	2.54	355
	Reproduction (4)	1910-39	976	458	66,631	.48	68
	Pole		203	107	6,255	.53	31
	Mature		74	15	423	.20	6
	Stream (1)		4	3	3,110	.75	778
	Total		2,184	1,705	315,311	.78	144
Second	Plantation	1945-49	295	471	115,811	1.60	393
	Cutover	1940-44	213	138	3,363	.65	16
	Cutover	1920-39	858	178	62,009	.21	72
	Reproduction (5)	1910-39	1,968	1,284	48,707	.65	25
	Pole (6)		1,095	982	38,213	.90	35
	Mature		85	25	40	.29	1
	Stream (2)		749	801	35,813	1.07	48
	Total		5,263	3,879	303,956	.74	58
Third	Cutover	1940-44	146	85	709	.58	5
	Cutover	1920-39	1,189	922	99,985	.78	84
	Reproduction (7)	1910-39	1,312	793	32,017	.60	24
	Pole (8)		233	115	9,058	.49	39
	Mature		86	46	1,955	.53	23
	Stream		372	244	14,414	.66	39
	Total		3,338	2,205	158,138	.66	47
GRAND TOTAL			10,785	7,789	777,405	.72	72

Chemical work included above:

Stream				Upland			
	Acres	Man-Days	Gallons Spray		Acres	Man-Days	Gallons Spray
(1)	4	3	29	(3)	347	283	9,596
(2)	15	9	89	(4)	231	137	411
				(5)	10	5	10
				(6)	57	46	29
				(7)	5	3	5
				(8)	51	55	51

TABLE 4

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1948
KANIKSU OPERATION

State	Working	Class	Acres	Man-Days	Ribes	Gallons Spray	Per Acre	
							Man-Days	Ribes
Idaho	First	EQ-Coop.	988	594	81,184	29	.60	82
		FS-Reg.	164	402	69,568	3,175	2.45	424
		Total	1,152	996	150,752	3,204	.86	131
	Second	EQ-Coop.	1,605	908	45,858		.57	29
		FS-Reg.	2,521	1,772	115,270	89	.70	46
		FS-Cont.	330	203	3,884		.62	12
		Total F.S.	2,851	1,975	119,154	89	.69	42
	Third	Total All	4,456	2,883	165,012	89	.65	37
		EQ-Coop.	1,913	1,353	129,058		.71	67
		FS-Reg.	801	510	16,157		.64	20
		FS-Cont.	500	253	3,825		.51	8
		Total F.S.	1,301	763	19,982		.59	15
		Total All	3,214	2,116	149,040		.66	46
	All Workings	EQ-Coop.	4,506	2,855	256,100	29	.63	57
		FS-Reg.	3,486	2,684	200,995	3,264	.77	58
		FS-Cont.	830	456	7,709		.55	9
		Total F.S.	4,316	3,140	208,704	3,264	.73	48
		Total All	8,822	5,995	464,804	3,293	.68	53
Washington	First	FS-Reg.	1,032	709	164,559	6,832	.69	159
	Second	FS-Reg.	807	996	138,944	39	1.23	172
	Third	FS-Reg.	124	89	9,098	56	.72	73
	All Workings	FS-Reg.	1,963	1,794	312,601	6,927	.91	159
Total	First	EQ-Coop.	988	594	81,184	29	.60	82
		FS-Reg.	1,196	1,111	234,127	10,007	.93	196
		Total All	2,184	1,705	315,311	10,036	.78	144
	Second	EQ-Coop.	1,605	908	45,858		.57	29
		FS-Reg.	3,328	2,768	254,214	128	.83	76
		FS-Cont.	330	203	3,884		.62	12
		Total F.S.	3,658	2,971	258,098	128	.81	71
		Total All	5,263	3,879	303,956	128	.74	58
	Third	EQ-Coop.	1,913	1,353	129,058		.71	67
		FS-Reg.	925	599	25,255	56	.65	27
		FS-Cont.	500	253	3,825		.51	8
		Total F.S.	1,425	852	29,080	56	.60	20
		Total All	3,338	2,205	158,138	56	.66	47
	All Workings	EQ-Coop.	4,506	2,855	256,100	29	.63	57
		FS-Reg.	5,449	4,478	513,596	10,191	.82	94
		FS-Cont.	830	456	7,709		.55	9
		Total F.S.	6,279	4,934	521,305	10,191	.79	83
		Total All	10,785	7,789	777,405	10,220	.72	72

TABLE 5

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1948
KANIKSU OPERATION

State	Working	Acres Worked											
		By Forest Service			By Bureau of Entomology and Plant Quarantine				Total				
		National Forest	Private	Total	National Forest	State	Private	Total	Federal Forest	Other			Total
										State	Private	Total	
Idaho	First	73	91	164	567	141	280	988	640	141	371	512	1,152
	Second	2,315	536	2,851	642	526	437	1,605	2,957	526	973	1,499	4,456
	Third	1,301		1,301	215	956	742	1,913	1,516	956	742	1,698	3,214
	Total	3,689	627	4,316	1,424	1,623	1,459	4,506	5,113	1,623	2,086	3,709	8,822
Washington	First	1,032		1,032					1,032				1,032
	Second	663	144	807					663		144	144	807
	Third	78	46	124					78		46	46	124
	Total	1,773	190	1,963					1,773		190	190	1,963
Total	First	1,105	91	1,196	567	141	280	988	1,672	141	371	512	2,184
	Second	2,978	680	3,658	642	526	437	1,605	3,620	526	1,117	1,643	5,263
	Third	1,379	46	1,425	215	956	742	1,913	1,594	956	788	1,744	3,338
	Total	5,462	817	6,279	1,424	1,623	1,459	4,506	6,886	1,623	2,276	3,899	10,785

TABLE 6

RIBES SPECIES ERADICATED, 1948
KANIKSU OPERATION

Working	Eradication Type	Acres	Ribes Species			Total Ribes
			Ribes lacustre	Ribes viscosissimum	Ribes inerme	
First	Cutover (1945-49)	281	37,856	29,976	685	68,517
	Cutover (1940-44)	596	100,580	51,821	234	152,635
	Cutover (1920-39)	50	16,397	834	509	17,740
	Reproduction (1910-39)	976	5,987	60,623	21	66,631
	Pole	203	4,307	1,939	9	6,255
	Mature	74	392	31		423
	Stream	4	3,110			3,110
	Total	2,184	168,629	145,224	1,458	315,311
Second	Plantation (1945-49)	295	6,326	109,485		115,811
	Cutover (1940-44)	213	3,181		182	3,363
	Cutover (1920-39)	858	40,972	20,409	628	62,009
	Reproduction (1910-39)	1,968	28,567	19,986	154	48,707
	Pole	1,095	22,124	15,511	578	38,213
	Mature	85	40			40
	Stream	749	34,292	8	1,513	35,813
	Total	5,263	135,502	165,399	3,055	303,956
Third	Cutover (1940-44)	146	565	144		709
	Cutover (1920-39)	1,189	59,745	40,240		99,985
	Reproduction (1910-39)	1,312	20,067	9,565	2,385	32,017
	Pole	233	3,800	5,258		9,058
	Mature	86	1,564	391		1,955
	Stream	372	12,727	735	952	14,414
	Total	3,338	98,468	56,333	3,337	158,138
All Workings	Plantation (1945-49)	295	6,326	109,485		115,811
	Cutover (1945-49)	281	37,856	29,976	685	68,517
	Cutover (1940-44)	955	104,326	51,965	416	156,707
	Cutover (1920-39)	2,097	117,114	61,483	1,137	179,734
	Reproduction (1910-39)	4,256	54,621	90,174	2,560	147,355
	Pole	1,531	30,231	22,708	587	53,526
	Mature	245	1,996	422		2,418
	Stream	1,125	50,129	743	2,465	53,337
	Total	10,785	402,599	366,956	7,850	777,405

TABLE 7

SUMMARY OF RIBES ERADICATION, 1923-1948
KANIKSU OPERATION

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Burn	1945-49	243	548	111,750	2.26	460	243	
	Plantation	1945-49	30	17	1,598	.57	53	30	473
	Cutover	1945-49	1,024	1,041	155,336	1.02	152	1,024	7,476
	Burn	1940-44	210	184	47,333	.88	225	210	
	Plantation	1940-44	2,631	1,317	490,404	.50	186	2,631	
	Cutover (4)	1940-44	4,658	3,677	689,560	.79	148	4,658	35,876
	Cutover	1920-39	12,147	8,924	1,875,327	.73	154	11,573	24,406
	Reproduction (5)	1910-39	167,156	119,625	32,833,391	.72	196	160,537	24,557
	Pole		129,959	45,813	6,357,958	.35	49	128,644	23,864
	Mature		142,774	30,837	5,824,592	.22	41	110,479	39,296
	Miscellaneous		7,387	5,011	1,995,603	.68	270	6,024	1,277
	Stream (1)		22,927	50,273	9,390,276	2.19	410	22,283	6,889
	Total		491,146	267,267	59,773,128	.54	122	448,336	164,114
Second	Plantation	1945-49	295	471	115,811	1.60	393	295	
	Plantation	1940-44	2,631	1,435	50,089	.55	19	2,631	
	Cutover	1940-44	565	337	10,470	.60	19	565	
	Cutover	1920-39	7,626	9,057	1,822,283	1.19	239	7,626	
	Reproduction (6)	1910-39	54,982	46,266	5,702,468	.84	104	54,074	
	Pole (7)		38,751	16,948	1,160,024	.44	30	38,751	
	Mature		7,372	4,044	360,045	.55	49	7,372	
	Miscellaneous		1,377	656	47,147	.48	34	1,377	
	Stream (2)		12,342	16,412	1,507,256	1.33	122	12,287	
	Total		125,941	95,626	10,775,593	.76	86	124,978	
Third	Plantation	1940-44	1,933	480	13,310	.25	7	1,933	
	Cutover	1940-44	146	85	709	.58	5	146	
	Cutover	1920-39	6,508	5,353	399,628	.82	61	6,508	
	Reproduction (8)	1910-39	18,506	16,743	1,227,817	.90	66	18,506	
	Pole (9)		2,334	695	66,111	.30	28	2,334	
	Mature		1,256	688	107,865	.55	86	1,256	
	Miscellaneous		637	288	5,587	.45	9	637	
	Stream (3)		1,835	2,118	90,094	1.15	49	1,835	
	Total		33,155	26,450	1,911,121	.80	58	33,155	
GRAND TOTAL			650,242	389,343	72,459,842	.60	111	606,469	

Chemical work included above:

Stream				Upland			
	Acres	Man-Days	Gallons Spray		Acres	Man-Days	Gallons Spray
(1)	90	109	3,704	(4)	347	283	9,596
(2)	20	21	199	(5)	231	137	411
(3)	47	15	150	(6)	10	5	10
				(7)	57	46	29
				(8)	5	3	5
				(9)	51	55	51

TABLE 8

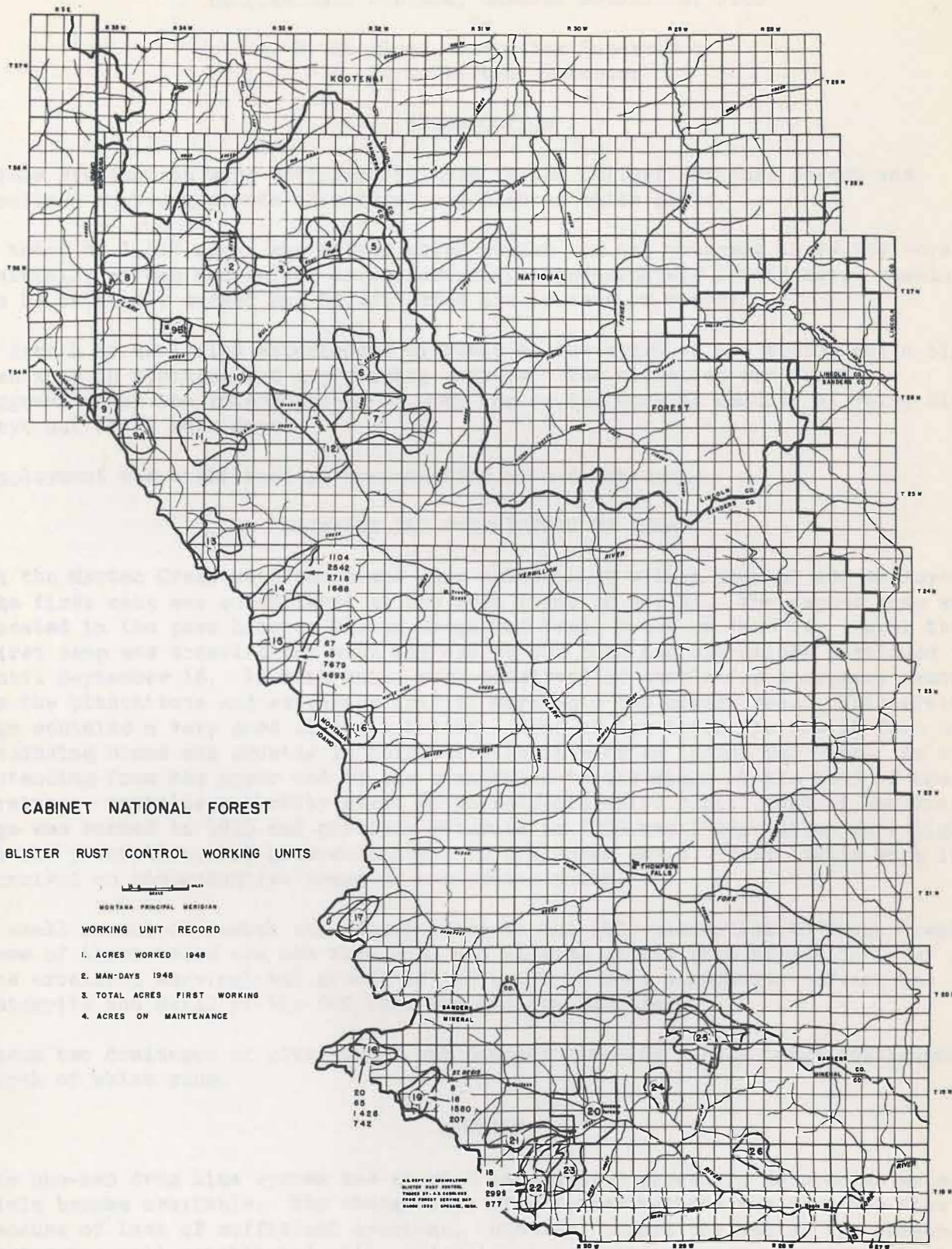
SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1923-1948
KANIKSU OPERATION

State	Class	Gross Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
						Man-Days	Ribes
Idaho	EQ-Reg.	18,796	6,844	1,066,689		.36	57
	EQ-Coop.	162,701	65,581	11,984,750	1,979	.40	74
	EQ-Emerg.	99,041	68,851	11,333,497		.70	114
	FS-Reg.	53,556	48,756	5,270,830	3,374	.91	98
	FS-Emerg.	99,269	38,823	8,788,474		.39	89
	CCC	62,419	50,478	8,451,835		.81	135
	FS-Cont.	830	456	7,709		.55	9
Washington	Total	496,612	279,789	46,903,784	5,353	.56	94
	EQ-Emerg.	31,629	19,288	6,754,071		.61	214
	FS-Reg.	63,307	51,175	11,301,494	8,802	.81	179
	FS-Emerg.	36,366	14,386	4,013,260		.40	110
	CCC	22,328	24,705	3,487,233		1.11	156
Total	Total	153,630	109,554	25,556,058	8,802	.71	166
	EQ-Reg.	18,796	6,844	1,066,689		.36	57
	EQ-Coop.	162,701	65,581	11,984,750	1,979	.40	74
	EQ-Emerg.	130,670	88,139	18,087,568		.67	138
	FS-Reg.	116,863	99,931	16,572,324	12,176	.86	142
	FS-Emerg.	135,635	53,209	12,801,734		.39	94
	CCC	84,747	75,183	11,939,068		.89	141
	FS-Cont.	830	456	7,709		.55	9
Total		650,242	389,343	72,459,842	14,155	.60	111

TABLE 9

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1923-1948
KANIKSU OPERATION

State	Ownership	Net Acres in Control Area					
		Acres Worked				Acres Unworked	Total Acres
		First	Second	Third	Total		
Idaho	National Forest	180,767	48,402	6,201	235,370	54,942	235,709
	Public Domain	54			54	80	134
	Subtotal Federal	180,821	48,402	6,201	235,424	55,022	235,843
	State	103,915	28,266	12,729	144,910	31,122	135,037
	Private	66,436	16,498	3,747	86,681	43,651	110,087
	Subtotal Other	170,351	44,764	16,476	231,591	74,773	245,124
	Total	351,172	93,166	22,677	467,015	129,795	480,967
Washington	National Forest	89,972	29,824	10,130	129,926	30,676	120,648
	State	2,080	80		2,160		2,080
	Private	5,112	1,908	348	7,368	3,643	8,755
	Subtotal Other	7,192	1,988	348	9,528	3,643	10,835
	Total	97,164	31,812	10,478	139,454	34,319	131,483
Total	National Forest	270,739	78,226	16,331	365,296	85,618	356,357
	Public Domain	54			54	80	134
	Subtotal Federal	270,793	78,226	16,331	365,350	85,698	356,491
	State	105,995	28,346	12,729	147,070	31,122	137,117
	Private	71,543	18,406	4,095	94,049	47,294	118,842
	Subtotal Other	177,543	46,752	16,824	241,119	78,416	255,959
	Total	448,336	124,978	33,155	606,469	164,114	612,450



BLISTER RUST CONTROL, CABINET OPERATION, 1948

By

A. S. Skoglund, Operation Supervisor

N. D. Fullerton, Forester

INTRODUCTION

Ribes eradication work performed in 1948 in the Cabinet National Forest was confined to young stands of natural and planted white pines.

A total of 1,217 acres was worked which brings the net progress to 79,989 acres initially worked and 16,560 acres reworked. Approximately 14,656 acres remain to be initially worked and 24,425 acres are in need of rework.

A dearth of qualified experienced overhead at the start of the season was a big handicap in training and supervising workers. The situation was further aggravated by the interruptions of work due to the unusual amounts of rain, 21 days out of 77 work days.

Employment was stabilized by the adoption of a 6-day week.

LOCATION AND DESCRIPTION OF AREAS

In the Marten Creek unit two camps were established with a peak of 100 employees. The first camp was established at the main forks on May 24. The second camp was located in the pass between Marten Creek and Trout Creek on June 14. Later the first camp was consolidated with the one at the pass and operations continued until September 16. In this unit, work consisted of completing necessary rework in the plantations and extending initial work into the upper areas. This drainage contains a very good 1931 plantation. Some of the trees are now 15 feet high, producing cones and growing in height at the rate of 18 inches per year. An area, extending from the upper end of the plantation to the ridge at the head of the drainage, contains a thrifty stand of 35-year-old white pine. Most of the drainage was burned in 1910 and portions reburned in 1930 and 1934. Ribes were light in the plantations but generally heavy in the upper basin. Very little work is involved on nonproductive areas or protection zones.

A small amount of rework was accomplished in the 1939 plantation in Trout Creek. Some of these trees are now head high and growing at the rate of one foot per year. The excellent survival and growth of the trees in this plantation reflect the integrity and skill of the CCC lads who did the planting.

These two drainages of plantations and natural stocking form a large contiguous block of white pine.

METHODS

The one-man drag line system was adopted as standard procedure as soon as materials became available. The change-over from former methods was somewhat slow because of lack of sufficient overhead. However, toward the end of the season the system was well established with production increasing on each new area. As a comparison, in adjacent areas with the same number of man-days expended per acre, three times as many ribes were removed per man-day of labor by the one-man method

as before. Also, on areas of comparable numbers of ribes per acre, the production was increased more than two-fold by use of the one-man method. Efficiency was very noticeably increased by the new method. In fact, it was necessary to rework several areas worked by three-man crews with the drag line system in order to place them in a satisfactory condition.

More acres of maintenance were obtained in one working on areas worked by the new system because the ribes population and distribution is broken down into smaller units for analysis. During this past season the additional expenditure of just a few man-days enabled 52 acres in one area to be placed on maintenance.

Power spraying with 2,4-D and Ammate sprays was completed in stream type along the St. Regis River. These areas contained heavy concentrations of various ribes species and brush. Previous sprays had been ineffective.

A plot was established to test the effectiveness of 2,4,5-T sprays in the treatment of Ribes triste and R. inerme. Results appear favorable but final conclusions cannot be drawn until next spring.

Effectiveness of the new chemicals has opened a new approach to many of the control problems. It will be possible to protect some fine white pine areas, as in Marten Creek and Rock Creek, where control work has been deferred because of heavy ribes concentrations. The proper application of these chemicals will reduce the cost of working as well as reduce in some cases the number of workings.

CHECKING

A regular four per cent check was made on all areas worked by regular crew methods. It was necessary to modify the checking procedure on the one-man lanes. A checker progressed through the lane on diagonal courses between the boundaries completing four of these courses in each 5-chain lot. A tie-in was made at each lot tag to correlate data with that of eradication. This modification gave a much higher per cent check. The cost remained comparable with the regular four per cent check since the checking process was facilitated by eliminating the need for compass and pacing. This elimination also tends to increase the effectiveness of the checker because the continuity of searching is not continually interrupted by the taking of compass shots. It is now practical to coordinate checking results with eradication data in $1\frac{1}{4}$ -acre lots. The data may be interpreted with a higher degree of accuracy on a smaller unit of area.

SURVEYS

Five men were trained to do stocking and disease surveys. Surveys were instituted on most areas not sampled during the past several years and are summarized in the following analysis:

WHITE PINE STOCKING AND BLISTER RUST LOSS SURVEY

Unit	Class	No. Chains	Total Stocking	Per Cent White Pine Stocking	Per Cent White Pine Stocked Quadrats Lost
Dry Cr.	1 & 2	199	Well	40	10.4
	3A	118	Well	10	0
Star Cr.	3B	151	Well	10	58
Snake Cr.	1 & 2	260	Well	37	23
	3A	110	Well	7	64
W. F. Marten Cr.	1 & 2	165	Well	35	4
	3A&3B	195	Well	12	5
S. F. Marten Cr.	1 & 2	258	Well	40	15
	3A	83	Med.	13	16
Trout Cr.	1 & 2	795	Well	42	8.6
	3A	31	Well	24	17
Sildex	2	197	Med.	20	50
	3A&3B	288	Med.	7	49
Rainy Cr.	2	347	Med.	26	44
	3A&3B	242	Well	8	61

CONTROL STATUS AND FUTURE PLANS

A total of 42,877 acres is now on a maintenance basis which represents 53 per cent of the worked area; 435 acres of maintenance were added as a result of this season's work.

The plantation on the south fork of Marten Creek is relatively free from blister rust. Occasional cankers of 1941 origin are found near the main stream. There is a small amount of pine infection in the stands beyond plantation boundaries, but all damage is confined to the trees adjacent to the heavy stream type. Completion of the work next season should stop the disease from spreading into the upland proper. Acreage was not claimed on several areas of heavy ribes concentrations that were only partially worked in 1948. A small amount of additional work should place these areas in a satisfactory status.

A survey found no rust in the 1939 Trout Creek plantation. Several small areas with ribes should be reworked next season to prevent any build-up. The control area should also be extended to the ridge on the north by removing the scattered R. viscosissimum found intermingled with white pine.

An inspection of White Pine Creek substantiated previous surveys showing that the area contains very thrifty planted and natural white pine on an excellent white pine site. A few cankers were found adjacent to the streams. A few widely scattered white pine snags up to four feet d.b.h. are evidence that a beautiful stand of white pine existed in the drainage previous to fire. This area should receive initial working next season to prevent spread of rust into the upland type.

The 1946 spraying operations on the west fork of Big Creek were effective in killing almost all the large bushes. However, these areas should be resprayed with 2,4,5-T sprays next season to remove any resprouts and seedlings.

Damage from pole blight was observed in the 60-year-old white pine stands in Snake and Engle Creeks. Some dying of all species was also observed in Engle Creek. One of the features of these two observations was the lack of any visible evidence that trees in the previous stands in these two localities had ever been much greater in diameter than at present. Age and composition of the stands are such that ribes regeneration will be of small consequence until there is considerable damage from the blight.

STATEMENT OF EXPENDITURES AND COSTS

The statement of expenditures and costs by cooperative agency and type of appropriation is shown in the following tabulations:

TABLE 1

EXPENDITURES BY APPROPRIATIONS, CALENDAR YEAR 1948 CABINET OPERATION

Cooperating Agency	Appropriation	Amount
Bureau of Entomology and Plant Quarantine	Regular BLR-1-4	\$ 2,095.41
Cabinet National Forest	Regular BLR-4	52,472.00
Total		\$54,567.41

TABLE 2

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1948 CABINET OPERATION

Item	Bureau of Entomology and Plant Quarantine	Cabinet National Forest	Total
	Regular BLR-1-4	Regular BLR-4	
Salaries & wages	\$1,834.20	\$38,472.00	\$40,306.20
Subs. supplies		11,035.00	11,035.00
Travel and transp.	260.02	1,084.00	1,344.02
Other Supplies	1.19	1,881.00	1,882.19
Total	\$2,095.41	\$52,472.00	\$54,567.41

TABLE 3
SUMMARY OF RIBES ERADICATION, 1948
CABINET OPERATION

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
First	Reproduction	1910-39	291	1,181	57,692	4.06	198
	Stream		35	53	3,880	1.51	111
	Total		326	1,234	61,572	3.79	189
Second	Reproduction	1910-39	769	1,266	55,940	1.65	73
	Stream (1)		122	208	93,021	1.70	762
	Total		891	1,474	148,961	1.65	167
GRAND TOTAL			1,217	2,708	210,533	2.23	173

Chemical work included above:

			Gallons
	Acres	Man-Days	Spray
(1)	28	83	9,060

TABLE 4
OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1948
CABINET OPERATION

Working	Acres Worked By Forest Service		
	National Forest	Private	Total
First	326		326
Second	888	3	891
Total	1,214	3	1,217

TABLE 5
RIBES SPECIES ERADICATED, 1948
CABINET OPERATION

Working	Eradication Type	Acres	Ribes Species					Total Ribes
			Ribes lacustre	Ribes viscosissimum	Ribes petiolare	Ribes inerme	Ribes triste	
First	Reproduction (1910-39)	291	46,543	11,149				57,692
	Stream	35	3,857	23				3,880
	Total	326	50,400	11,172				61,572
Second	Reproduction (1910-39)	769	50,970	4,970				55,940
	Stream	122	11,192	99	18,730	12,900	50,100	93,021
	Total	891	62,162	5,069	18,730	12,900	50,100	148,961
All Workings	Reproduction (1910-39)	1,060	97,513	16,119				113,632
	Stream	157	15,049	122	18,730	12,900	50,100	96,901
	Total	1,217	112,562	16,241	18,730	12,900	50,100	210,533

TABLE 6

SUMMARY OF RIBES ERADICATION, 1928-1948
CABINET OPERATION

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Reproduction	1910-39	35,800	38,031	6,479,610	1.06	181	35,231	5,810
	Pole		25,959	9,213	1,745,885	.35	67	25,670	7,134
	Mature		9,377	4,457	1,064,702	.48	114	9,357	1,712
	Miscellaneous		4,900	2,230	596,499	.46	122	4,657	
	Stream (1)		5,074	16,166	3,653,988	3.19	720	5,074	
	Total		81,110	70,097	13,540,684	.86	167	79,989	14,656
Second	Reproduction	1910-39	6,737	10,891	900,295	1.62	134	6,737	
	Pole		1,108	1,423	101,767	1.28	92	1,108	
	Mature		28	27	1,799	.96	64		28
	Miscellaneous		33	34	1,503	1.03	46	33	
	Stream (2)		3,140	5,729	727,480	1.82	232	3,140	
	Total		11,046	18,104	1,732,844	1.64	157	11,046	
Third and Other	Reproduction	1910-39	2,139	2,534	124,201	1.18	58	2,139	
	Pole		125	149	7,256	1.19	58	125	
	Stream (3)		3,250	3,922	193,635	1.21	60	3,250	
	Total		5,514	6,605	325,092	1.20	59	5,514	
GRAND TOTAL			97,670	94,806	15,598,620	.97	160	96,549	

Chemical work included above:

	Gallons		
	Acres	Man-Days	Spray
(1)	722	1,999	61,090
(2)	250	579	26,821
(3)	68	269	4,623

TABLE 7

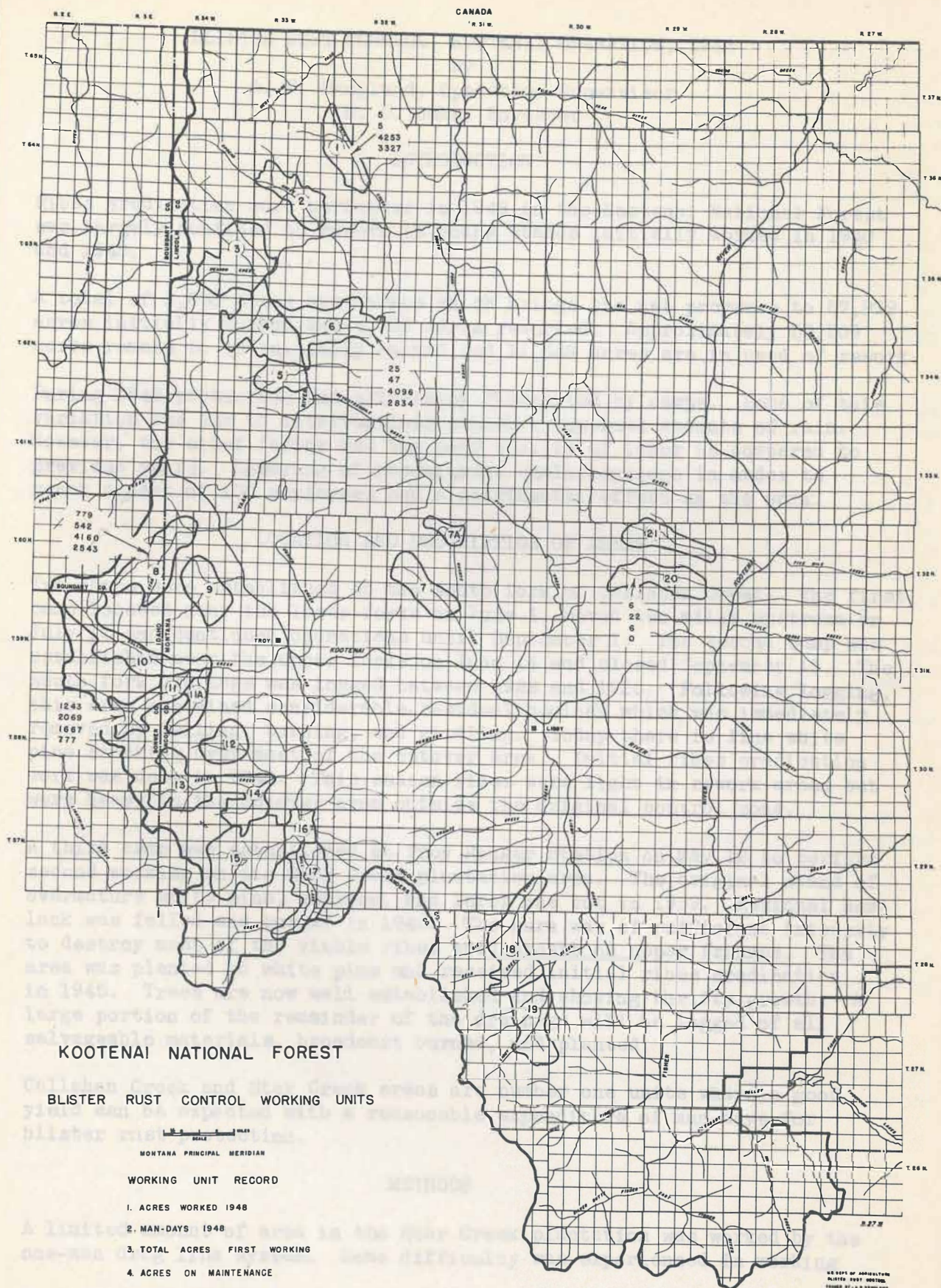
SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1928-1948
CABINET OPERATION

Class	Gross Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
					Man-Days	Ribes
EQ-Reg.	2,002	3,295	761,710	34,795	1.65	380
EQ-Emergency	34,321	16,293	3,840,639	1,330	.47	112
FS-Reg.	27,037	38,752	3,489,158	28,446	1.43	129
FS-Emergency	31,172	30,968	6,990,634	21,638	.99	224
CCC	3,138	5,498	516,479	6,325	1.75	165
Total	97,670	94,806	15,598,620	92,534	.97	160

TABLE 8

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1928-1948
CABINET OPERATION

Ownership	Net Acres in Control Area						
	Acres Worked				Acres Unworked	Total Acres	
	First	Second	Third	Total			
National Forest	63,377	8,990	3,500	75,867	10,649	74,026	
Public Domain	40	3		43		40	
Subtotal Federal	63,417	8,993	3,500	75,910	10,649	74,066	
State	734	1		735		734	
Private	15,838	2,052	2,014	19,904	4,007	19,845	
Subtotal Other	16,572	2,053	2,014	20,639	4,007	20,579	
Total	79,989	11,046	5,514	96,549	14,656	94,645	



US DEPT OF AGRICULTURE
PLISTED RUST DOGWOOD
FRAMES BY - A. B. BRADLEY
FROM FOREST SERVICE MAP
MARCH 1955 STANLEY, MISS.

BLISTER RUST CONTROL, KOOTENAI OPERATION, 1948

By

A. S. Skoglund, Operation Supervisor

M. D. Oaks, Forester

INTRODUCTION

Ribes eradication work performed in 1948 in the Kootenai National Forest was largely confined to rework in young stands initially worked in 1940 and 1945.

A total of 2,058 acres was worked which brings the net progress to 57,899 acres initially worked and 4,786 acres reworked. Approximately 55,509 acres remain to be initially worked and 11,648 acres are in need of rework.

During 1948 production and efficiency fluctuated by camps. Some of this variation was due to interruptions caused by unusual amounts of rain. However, the chief factor was the poor quality of labor as compared to previous years. Lowering of recruitment qualifications in order to reach a peak of 100 employees had a detrimental effect on the work.

LOCATION AND DESCRIPTION OF AREAS

Two camps were established on the south fork of Callahan Creek. The first camp located near the lower forks on June 1, moved two miles upstream on July 12 and continued operations until September 1. The second camp was established near the upper forks on June 14 and closed September 15. The south fork drainage was logged between 1922 and 1925. Following logging, this area contained considerable residual hemlock which was immediately removed by felling, burning, and girdling. Today there is fine white pine stocking over most of the cutover area. Initial ribes eradication work was done in 1940. This season ribes were light in rework areas but were heavy in the cutover area outside the original control zone.

A third camp was established at Troy Ranger Station on May 12 to perform second working on the Star Creek plantation area. The original stand of overmature white pine, hemlock, and larch was cut in 1939. Residual hemlock was felled and burned in 1942. The burn was of sufficient intensity to destroy most of the viable ribes seed except on upper fringes. The area was planted to white pine and received initial ribes eradication in 1945. Trees are now well established and showing thrifty growth. A large portion of the remainder of the drainage will be logged of all salvageable materials, broadcast burned, and planted.

Callahan Creek and Star Creek areas are number one units where a good yield can be expected with a reasonable expenditure of man-days for blister rust protection.

METHODS

A limited amount of area in the Star Creek plantation was worked by the one-man drag line system. Some difficulty was experienced in working

among down logs due to lack of wax for treating lines and to the knotty lines that were received. This method demonstrated wide variation in output among members of the crew. In four adjacent lanes, 30 chains long, the output per man-day varied from .4 to .8 man-day per acre. On other lanes of comparable numbers of ribes per acre, the variation was .48 to .76 man-day per acre. These comparisons demonstrate the need for more selective recruitment of laborers.

Under the one-man system, data are broken down by $1\frac{1}{4}$ -acre lots. An analysis of work on the Star Creek plantation showed an average of less than 12 ribes per acre for the 240 acres while by lots the ribes varied from zero to 160 per acre. In 50 of the $1\frac{1}{4}$ -acre lots, no ribes were removed or found on the check. About 20 lots contained only one ribes. None of this area could be placed in a maintenance status due to recent burning and planting.

In the future, many man-days can be saved by safely eliminating from further work over 35 per cent of the total area.

Power spray work along the Yaak River was highly successful in removing heavy concentrations of ribes with a reasonable number of man-days of labor. Ammate and 2,4,5-T sprays were applied with knapsack sprayers to Ribes lacustre and R. coloradense in upland stream type areas in Callahan Creek. Spraying operations in Burnt Creek were very effective, but 2,4,5-T sprays should be applied next season to destroy occasional resprouts and seedlings.

Effectiveness of new chemicals together with better means of applying them will go a long way in solving many of the control problems. Areas such as the upper basin in Red Top Creek should receive initial work now that they may be treated with 2,4,5-T sprays.

CHECKING

A regular four per cent check was made on all areas worked by regular crew methods. It was necessary to modify the checking procedure on one-man lanes. A checker progressed through the lane on diagonal courses between boundaries completing four of these courses in each 5-chain lot. A tie-in was made at each lot tag to correlate data with that of eradication.

This modification makes it practical to interpret checking results with a higher degree of accuracy on a smaller unit of area.

SURVEYS

Five men were trained to do stocking and disease surveys. Results of this survey are summarized as follows:

WHITE PINE STOCKING AND BLISTER RUST LOSS SURVEY

Unit	Class	No. of Chains	Per Cent White Pine Stocking	Per Cent White Pine Stocked Quadrats Lost
Spread Creek	1 & 2	339	31	1.4
	3A	331	5	0
Meadow Creek	1 & 2	247	27	0
Crawford Creek	3A	79	13	0
4th of July Creek	2	59	16	0
	3A	338	9	2.9
Burnt Creek	3A	460	11	3
N. F. Callahan Creek	2	248	22	7.4
	3A & 3B	169	11	7
S. F. Keeler Creek	2	131	23	10
	3A	148	9	6.5
Spar Creek	2	105	31	3.8
Cherry Creek	1 & 2	514	27	.7
	3A & 3B	178	5	0
Howard Lake	2	222	7	2.1
	3B	250	2	4.7
Barron Creek	2	250	20	1
	3B	871	4	0
Lower Cherry Creek	2	166	15	3.5
	3B	230	6	10.2

All areas well stocked.

CONTROL STATUS AND FUTURE PLANS

A total of 32,703 acres is now on maintenance. This represents 56 per cent of the worked area. As a result of this season's work, 457 acres of maintenance were added.

There is little rust in the Yaak River working units as determined by disease surveys. Early ribes eradication work performed prior to any appreciable evidence of rust has served to limit the spread of rust. A majority of the areas has received only one working.

There are several areas of young white pine in Meadow Creek that should be watched closely for rust development and worked immediately if there is evidence of any spread.

Ecological conditions have changed very little since logging in the Barron Creek unit. Ribes are mainly confined to streams and heavily disturbed areas. These conditions favor ribes eradication almost entirely by chemical methods.

It is gratifying to observe the amount of protection afforded by one working in 1940 in the Callahan Creek drainage. Rust is very heavy in upper

cutover areas outside the control zone, but these conditions extend into the control area for only about 4 chains. Second working completed in 1948 should provide adequate protection in most areas. In those portions where ribes seedlings are prevalent, another working will be necessary in a few years.

Cherry Creek, Howard Lake, and Farway Creek units are the major unworked areas remaining in the Kootenai Forest. Some rust is present in the Cherry Creek unit. One working should be sufficient to protect most of this stand if ribes eradication work is completed before intensification occurs. Scattered and variable amounts of rust occur in the Howard Lake unit. Pathological and ecological conditions in this area should be studied for another year to determine the feasibility of protecting this unit. Effect of the 1947 infection year will not be fully determined until 1949. Blister rust is spreading and will cause damage to the 55-year-old stand of white pine in Farway Creek. Control measures should be instituted without further delay.

STATEMENT OF EXPENDITURES AND COSTS

The statement of expenditures and costs by cooperative agency and type of appropriation is shown in the following tabulations:

TABLE 1

EXPENDITURES BY APPROPRIATIONS, CALENDAR YEAR 1948 KOOTENAI OPERATION

Cooperating Agency	Appropriation	Amount
Bureau of Entomology and Plant Quarantine	Regular BLR-1-4	\$ 2,094.23
Kootenai National Forest	Regular BLR-4	80,946.27
Total		\$83,040.50

TABLE 2

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1948 KOOTENAI OPERATION

Item	Bureau of Entomology and Plant Quarantine	Kootenai National Forest	Total
	Regular BLR-1-4	Regular BLR-4	
Salaries & wages	\$1,834.20	\$51,799.97	\$53,634.17
Subs. supplies		13,785.27	13,785.27
Equipment		1,505.31	1,505.31
Travel and transp.	260.03	1,294.75	1,554.78
Other		12,560.97	12,560.97
Total	\$2,094.23	\$80,946.27	\$83,040.50

TABLE 3
SUMMARY OF RIBES ERADICATION, 1948
KOOTENAI OPERATION

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
First	Cutover	1920-39	110	8	4,428	.07	40
	Reproduction (3)	1910-39	30	465	40,607	15.50	1,354
	Mature		32	70	15,097	2.19	472
	Stream (1)		22	105	109,013	4.77	4,955
	Total		194	648	169,145	3.34	872
Second	Plantation	1945-49	236	184	2,742	.78	12
	Cutover	1920-39	322	262	9,803	.81	30
	Reproduction	1910-39	721	936	62,852	1.30	87
	Pole		240	126	2,913	.53	12
	Mature (4)		17	15	7,590	.88	446
	Stream (2)		328	514	37,595	1.57	115
	Total		1,864	2,037	123,495	1.09	66
GRAND TOTAL			2,058	2,685	292,640	1.30	142

Chemical work included above:

Stream				Upland			
		Gallons				Gallons	
Acres	Man-Days	Spray		Acres	Man-Days	Spray	
(1)	19	79	10,650	(3)	10	50	620
(2)	15	16	1,950	(4)	5	5	750

TABLE 4
OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1948
KOOTENAI OPERATION

Working	Acres Worked By Forest Service		
	National Forest	Private	Total
First	182	12	194
Second	1,854	10	1,864
Total	2,036	22	2,058

TABLE 5
RIBES SPECIES ERADICATED, 1948
KOOTENAI OPERATION

Working	Eradication Type	Acres	Ribes Species				Total Ribes
			Ribes lacustre	Ribes viscosissimum	Ribes inerme	Ribes coloradense	
First	Cutover (1920-39)	110	2,759	1,669			4,428
	Reproduction (1910-39)	30	25,516	8,141		6,950	40,607
	Mature	32	15,006			91	15,097
	Stream	22	12,740		93,800	2,473	109,013
	Total	194	56,021	9,810	93,800	9,514	169,145
Second	Plantation (1945-49)	236	440	2,302			2,742
	Cutover (1920-39)	322	3,061	6,742			9,803
	Reproduction (1910-39)	721	60,915	1,799		138	62,852
	Pole	240	2,576	337			2,913
	Mature	17	7,585	5			7,590
	Stream	328	26,701	1,389	9,500	5	37,595
	Total	1,864	101,278	12,574	9,500	143	123,495
All Workings	Plantation (1945-49)	236	440	2,302			2,742
	Cutover (1920-39)	432	5,820	8,411			14,231
	Reproduction (1910-39)	751	86,431	9,940		7,088	103,459
	Pole	240	2,576	337			2,913
	Mature	49	22,591	5		91	22,687
	Stream	350	39,441	1,389	103,300	2,478	146,608
	Total	2,058	157,299	22,384	103,300	9,657	292,640

TABLE 6

SUMMARY OF RIBES ERADICATION, 1935-1948
KOOTENAI OPERATION

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Plantation	1945-49	244	125	5,462	.51	22	244	
	Cutover	1945-49							80
	Cutover	1940-44							5,730
	Cutover	1920-39	1,274	767	55,365	.60	43	1,274	3,651
	Reproduction (3)	1910-39	13,833	9,658	1,135,896	.70	82	13,099	9,685
	Pole		23,926	10,721	1,031,320	.45	43	23,014	19,866
	Mature		17,204	4,447	609,512	.26	35	16,199	16,497
	Miscellaneous		346	95	7,956	.27	23		346
	Stream (1)		3,951	12,467	1,681,093	3.16	425	3,723	
	Total		60,778	38,280	4,526,604	.63	74	57,899	55,509
Second	Plantation	1945-49	236	184	2,742	.78	12	236	
	Cutover	1920-39	322	262	9,803	.81	30	322	
	Reproduction	1910-39	1,437	1,303	93,532	.91	65	1,437	
	Pole		1,469	1,288	59,260	.88	40	1,469	
	Mature (4)		17	15	7,590	.88	446		17
	Stream (2)		1,378	2,723	149,575	1.98	109	1,150	
	Total		4,859	5,775	322,502	1.19	66	4,631	
Third and Other	Pole		133	276	10,360	2.08	78		133
	Stream		22	14	738	.64	34		22
	Total		155	290	11,098	1.87	72		155
GRAND TOTAL			65,792	44,345	4,860,204	.67	74	62,685	

Chemical work included above:

Stream				Upland			
		Gallons				Gallons	
Acres	Man-Days	Spray		Acres	Man-Days	Spray	
(1) 149	297	16,563		(3) 10	50	620	
(2) 15	16	1,950		(4) 5	5	750	

TABLE 7

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1935-1948
KOOTENAI OPERATION

Class	Gross Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
					Man-Days	Ribes
EQ-Emergency	31,755	14,494	1,934,776		.46	61
FS-Reg.	18,160	18,257	1,592,809	19,883	1.01	88
FS-Emergency	4,540	4,652	377,089		1.02	83
CCC	11,337	6,942	955,530		.61	84
Total	65,792	44,345	4,860,204	19,883	.67	74

TABLE 8

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1935-1948
KOOTENAI OPERATION

Ownership	Net Acres in Control Area					
	Acres Worked				Unworked	Total Acres
	First	Second	Third	Total		
National Forest	54,727	4,080	155	58,962	44,503	99,230
State					173	173
Private	3,172	551		3,723	10,833	14,005
Subtotal Other	3,172	551		3,723	11,006	14,178
Total	57,899	4,631	155	62,685	55,509	113,408

BLISTER RUST CONTROL, MOUNT RAINIER NATIONAL PARK, 1948

By

J. C. Gynn, Operation Supervisor

Ribes eradication work for the control of white pine blister rust on Mount Rainier National Park during 1948 was carried on in both the Longmire-Silver Forest and White River areas, as recommended in the 1947 report.

White River. Ribes eradication work was performed with a 10-man crew and superintendent. With one portable power spraying unit and three back pack hand pump units, 185 acres of stream type ribes were sprayed at an expenditure of .92 man-day per acre. This is approximately one-fourth the time ordinarily consumed in working such areas by hand methods. The hormone chemical 2,4,5-T at the ratio of 2,000 parts per million in water was used. During late season spraying, the ratio was increased to 2,500 parts per million. A combination of hand and chemical methods was employed to remove the ribes from 189 acres of precipitous upland. All of the 374 acres worked at White River this season will be classified for rework until checking and future inspections are completed in 1949.

Longmire-Silver Forest. Acres worked 690, man-days per acre 1.07, ribes removed per acre 26. The crew averaged 27 men including 2 experienced foremen and 1 experienced superintendent. Work started June 14 and continued until September 16. Fifty acres of heavy ribes concentration were treated with 2,4,5-T mixed to the ratio of 1 part to 19 parts of fuel oil applied as an aerial spray. The chemical method appears to be entirely successful in this area. Complete results as to degree of kill on some species of ribes will not be apparent until the spring of 1949. Canker elimination was performed on 190 acres of reproduction and pole size white pine. Although no checking work was done during the 1948 season, random inspections indicated good quality work. The use of the one-man drag line method resulted in superior work wherever employed. As most of the 1948 work was in steep and precipitous areas, this method could not be extensively used. Changes in the maintenance classification of the 1948 workings will not be made until after checking in 1949.

RECOMMENDATIONS

The frequent and prolonged periods of wet weather occurring during the 1948 season caused a considerable curtailment in final accomplishments. Rains hampered both spraying and hand eradication crews for 9 consecutive days in July and 11 consecutive days during August, and a number of 1- or 2-day periods. Some work attempted during wet fogs and following rains had to be redone. In spite of this lost time, accomplishments were sufficient to begin the maintenance program proposed in the 1947 report with but an increase of five additional men for 1949.

The following is recommended for the 1949 blister rust control program in Mount Rainier National Park: For a complete 3-month period starting about June 13, a crew composed of eight men, one checker (SP-6) and one superintendent (SP-7). One additional Hi-Fog gun should be purchased. This will make available four Park-owned Hi-Fog guns and three hand pump units on temporary loan from the Bureau of Entomology and Plant Quarantine.

White River. Complete the cliff area unfinished in 1948 located between and adjacent to the White River campground and Sunrise Park control areas. Most of the ribes in this precipitous area can be eradicated chemically. All 1948 sprayed area should be checked at the start of the season to determine number of missed bushes and degree of kill obtained. Any areas indicated by the check as needing rework are to be resprayed. This work should be completed between June 13 and July 22. The crew should then be moved to the Longmire-Silver Forest area to proceed as outlined below.

Longmire-Silver Forest. Using the one-man drag line method, complete the area unfinished in 1948. Using 2,4,5-T, spray the seedlings occurring in the area known as "Hell's Half Acre." After completing this work, the maintenance program should be carried out in accordance with the needs indicated by the 1949 check.

It is suggested all men hired be chosen with extreme care, the Park being assured by each man of his intention to remain on the job for the entire season. Men assigned to the blister rust project should not be transferred to other activities unless unsuited for ribes eradication work. In order to efficiently carry on the maintenance program, all men should be trained in the chemical and one-man drag line methods, and methods suitable for cliff and precipitous slopes. Several members of the Park personnel are highly experienced in the use of safety ropes for cliff climbing. They have expressed the opinion they could easily train several blister rust workers in the use of safety ropes for ribes eradication on cliffs and the steep slopes of the Longmire-Silver Forest area.

Conclusion. If the above recommendations are effectively carried out in 1949, a small maintenance crew will be able to maintain the eradication standards necessary for control as outlined in the 1947 report.

RESULTS

The following tables show statements of expenditures, results of the 1948 field work, and accumulative results of all work performed to date:

TABLE 1

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1948 MOUNT RAINIER NATIONAL PARK

Item	National Park Service
Personal Services	\$23,568.03
Communication Service	1.95
Other Contractual Services	2,002.43
Supplies & Materials	661.15
Total	\$26,233.56

TABLE 2
SUMMARY OF RIBES ERADICATION, 1948
MOUNT RAINIER NATIONAL PARK

Area	Working	Acres	Man-Days	Ribes Species					Total Ribes	Gallons Spray	Per Acre	
				Ribes lacustre	Ribes viscosissimum	Ribes bracteosum	Ribes laxiflorum	Ribes acerifolium			Man-Days	Ribes
Longmire*	Other	690	736	16,536		956	205	571	18,268	100	1.07	26
White River	First	9	18	7,628		722		120	8,470		2.00	941
	Other	365	426	54,215	5,231	10,211	12,205		81,862	2,600	1.17	224
	Total	374	444	61,843	5,953	10,211	12,205	120	90,332	2,600	1.19	242
All Areas	First	9	18	7,628		722		120	8,470		2.00	941
	Other	1,055	1,162	70,751	5,231	11,167	12,410	571	100,130	2,700	1.10	95
	Total	1,064	1,180	78,379	5,953	11,167	12,410	691	108,600	2,700	1.11	102

*Not included above
Canker Elimination
Acres - 190
Man-Days - 375

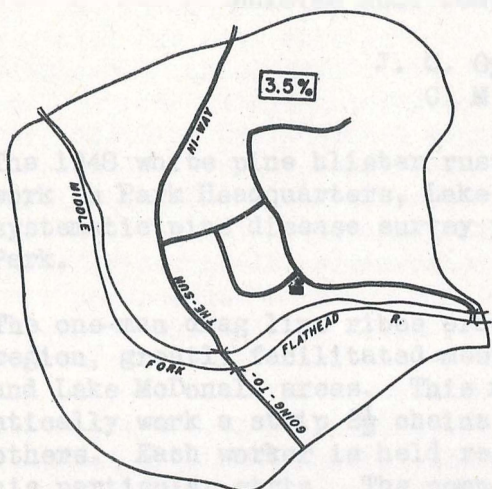
TABLE 3
SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1930-1948
MOUNT RAINIER NATIONAL PARK

Class	Gross Acres	Net Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
						Man-Days	Ribes
NP-Reg.	11,550	10,741	11,344	1,086,188	2,700	.98	94
NP-CCC	10,960	6,089	12,692	1,293,167		1.16	118
Total	22,510	16,830	24,036	2,379,355	2,700	1.07	106

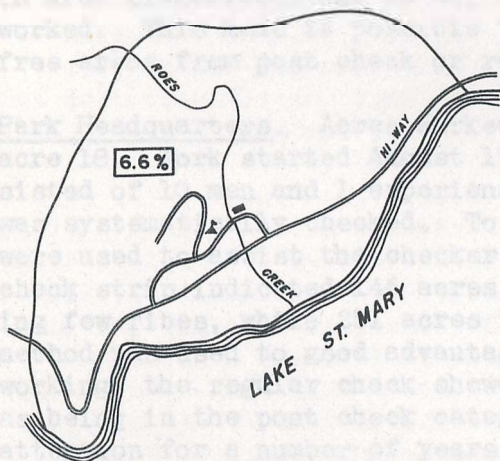
TABLE 4
SUMMARY OF RIBES ERADICATION, 1930-1948
MOUNT RAINIER NATIONAL PARK
(NET CONTROL AREA)

Area	Working	Acres	Man-Days	Ribes Destroyed								Total Ribes	Per Acre	
				Ribes lacustre	Ribes viscosissimum	Ribes bracteosum	Ribes watsonianum	Ribes laxiflorum	Ribes acerifolium	Ribes sanguineum	Ribes triste		Man-Days	Ribes
Longmire	First	900	1,599	225,968		98,875		59,308	8,642	16		392,809	1.78	436
	Second	888	797	30,938		24,332		2,394	2,888	50		60,602	.90	68
	Other	3,072	4,490	89,581		19,959		4,051	42,622	15		156,228	1.46	51
	Total	4,860	6,886	346,487		143,166		65,753	54,152	81		609,639	1.42	125
White River	First	2,690	3,163	378,460	84,847	5,429	140,613	10,564	11,348	189	752	632,202	1.18	235
	Second	2,652	2,484	70,531	16,315	2,330	6,941	16,229	4,537			116,883	.94	44
	Other	6,628	3,094	88,052	18,093	10,644	13,892	15,072	5,759			151,512	.47	23
	Total	11,970	8,741	537,043	119,255	18,403	161,446	41,865	21,644	189	752	900,597	.73	75
All Areas	First	3,590	4,762	604,428	84,847	104,304	140,613	69,872	19,990	205	752	1,025,011	1.33	286
	Second	3,540	3,281	101,469	16,315	26,662	6,941	18,623	7,425	50		177,485	.93	50
	Other	9,700	7,584	177,633	18,093	30,603	13,892	19,123	48,381	15		307,740	.78	32
	Total	16,830	15,627	883,530	119,255	161,569	161,446	107,618	75,796	270	752	1,510,236	.93	90

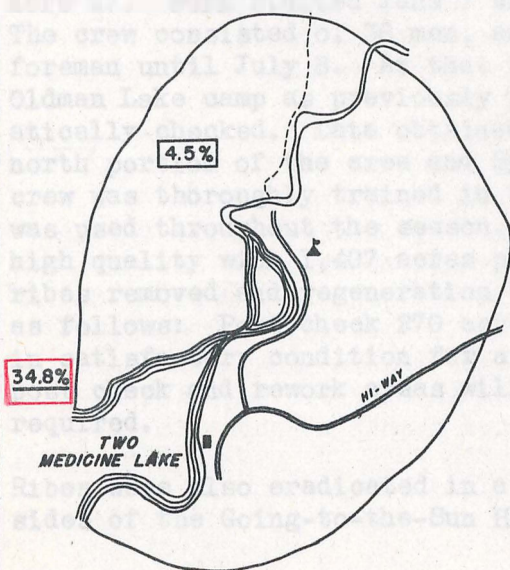
PARK HEADQUARTERS



EAST GLACIER



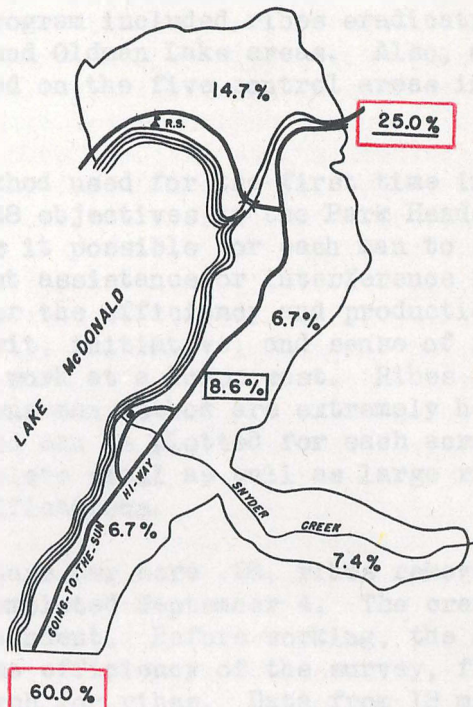
TWO MEDICINE



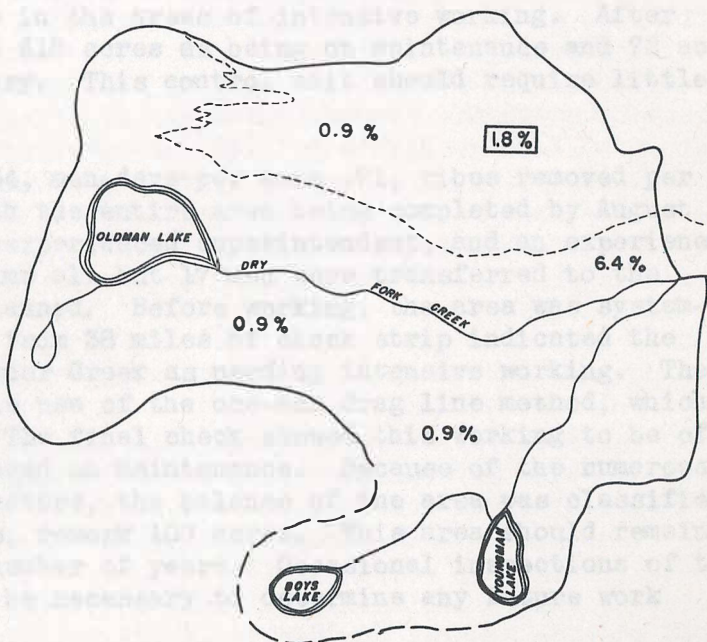
GLACIER NATIONAL PARK

BLISTER RUST INFECTION BY CONTROL AREAS

LAKE McDONALD



OLDMAN LAKE



LEGEND

— CONTROL AREA BOUNDARY
14.7% PER CENT TREES INFECTED

[8.6%] AVERAGE FOR AREA

[25.0%] OUTSIDE CONTROL AREA

BLISTER RUST CONTROL, GLACIER NATIONAL PARK, 1948

By

J. C. Gynn, Operation Supervisor

C. M. Chapman, Pathologist

The 1948 white pine blister rust control program included ribes eradication work in Park Headquarters, Lake McDonald, and Oldman Lake areas. Also, a systematic pine disease survey was conducted on the five control areas in the Park.

The one-man drag line ribes eradication method used for the first time in this region, greatly facilitated meeting the 1948 objectives in the Park Headquarters and Lake McDonald areas. This method makes it possible for each man to systematically work a strip $2\frac{1}{2}$ chains wide without assistance or interference from others. Each worker is held responsible for the efficiency and production on his particular strip. The competitive spirit, initiative, and sense of responsibility created, resulted in high quality work at a lower cost. Ribes eradication data recorded while using the one-man method are extremely helpful in area classifications as all ribes removed can be plotted for each acre worked. This made it possible to safely delete small as well as large ribes-free areas from post check or rework classifications.

Park Headquarters. Acres worked 449, man-days per acre .28, ribes removed per acre 18. Work started August 17 and was completed September 4. The crew consisted of 10 men and 1 experienced superintendent. Before working, the area was systematically checked. To increase the efficiency of the survey, flankers were used to assist the checker in his search for ribes. Data from 18 miles of check strip indicated 146 acres as needing intensive working, 303 acres supporting few ribes, while 251 acres required no treatment. The one-man drag line method was used to good advantage in the areas of intensive working. After working, the regular check showed 618 acres as being on maintenance and 72 acres as being in the post check category. This control unit should require little attention for a number of years.

Lake McDonald. Acres worked 1,454, man-days per acre .71, ribes removed per acre 27. Work started June 7 with the entire area being completed by August 16. The crew consisted of 38 men, an experienced superintendent, and an experienced foreman until July 8. At that time all but 17 men were transferred to the Oldman Lake camp as previously planned. Before working, the area was systematically checked. Data obtained from 38 miles of check strip indicated the north portion of the area and Snyder Creek as needing intensive working. The crew was thoroughly trained in the use of the one-man drag line method, which was used throughout the season. The final check showed this working to be of high quality with 1,407 acres placed on maintenance. Because of the numerous ribes removed and regeneration factors, the balance of the area was classified as follows: Post check 270 acres, rework 100 acres. This area should remain in satisfactory condition for a number of years. Occasional inspections of the post check and rework areas will be necessary to determine any future work required.

Ribes were also eradicated in a roadside strip 5.9 miles long paralleling both sides of the Going-to-the-Sun Highway. This area starts at the north boundary

of the Park Headquarters' 1929 burn and extends to the south boundary of the Lake McDonald control unit. The strip averaged about 5 chains wide from the lake shore into the ribes-free dense timber stand on the east side of the road. Practically the entire area was worked during training and wet weather periods. It was later mopped up by a well-trained crew. The strip supports a good stand of western white pine reproduction from which numerous ribes were removed. Considerable infection was found on both pine and ribes in the north end of the strip adjacent to the Lake McDonald control unit. Elimination of this source of infection will considerably lessen the volume of airborne sporidia channeled along the right of way going directly into the Lake McDonald control unit now on a maintenance basis. The approximately 240 acres covered were not added to the Park's permanent control units.

East Glacier. A four per cent check was made as recommended in 1947 and the data indicate nearly the entire area presents a small bush and seedling problem. Ribes setosum seedlings are occurring in large numbers along Roes Creek and the campgrounds and vicinity. R. inerme seedlings are present in the stream type and grass areas bordering St. Mary Lake. As most of the ribes are hidden in the tall grass covering the area, visibility is poor and searching difficult. With chemical and the one-man method, these ribes can be eliminated at a reasonable cost. The check also showed several areas worked in 1947 during wet weather as not meeting control standards. The entire unit was classified as rework because of seedlings and small bushes remaining in the area.

Oldman Lake. Acres worked 382, man-days per acre 2.42, ribes removed per acre 149. Ribes eradication started July 5. The crew averaged about 22 high caliber college men supervised by an experienced superintendent and an experienced foreman. Only a small amount of personnel turnover occurred until August 21, when the men started leaving for school. Camp closed September 1. All but two small cliff areas of original working were completed. As all work was confined to cliffs and precipitous slopes, two to three surface acres were worked for every one claimed. The available supply of the hormone chemical 2,4,5-T was not sufficient to start the recommended chemical ribes eradication program. This chemical will be available in 1949. Data secured on 10 miles of check strip indicate rework is necessary in the reproduction and pole types on the east side of the area as anticipated. The check also shows that good quality of work was performed in the difficult cliff operations. A control status classification will not be made of the area until work as recommended for 1949 has been completed.

BLISTER RUST INFECTION

Pine disease surveys were systematically run in the five control units in the park. All data were plotted on 8-inch-to-the-mile maps showing the location and number of trees infected on each 5 chains of strip. This information can now be coordinated with ribes checking and eradication data in sound maintenance planning. By comparing future infection survey information, the degree of control can be definitely determined. Infection information was also recorded outside control boundaries in the unprotected stands adjacent to the Lake McDonald and Two Medicine areas.

Park Headquarters. On 582 chains of survey strip 457 Pinus monticola were examined for rust. Only 16 trees or 3.5 per cent were infected with 2 trees having killing cankers. Two cankers were later than 1943 origin, one 1944 and one 1945 inception. As no incipient cankers were found, very little if any infection has occurred since the 1945 working.

Lake McDonald. In the north portion of the area, 197 P. monticola were examined on 315 chains of strip, 29 trees or 14.7 per cent were infected with only 4 having killing cankers. Latest infection was of 1943 origin. In the east portion of the area, 208 trees were examined on 346 chains of strip, 14 trees or 6.7 per cent were infected with only one having a killing canker. Only three cankers were later than 1943 origin, two of 1944 inception and one of 1945. In the Snyder Creek area, 624 P. monticola were examined on 242 chains of strip, 46 trees or 7.4 per cent were infected, 14 or 2.24 per cent had killing cankers. Infection of 1945 and 1946 origin was present. Control work was started in this area in 1945. In unworked area northeast of the control boundary, 80 P. monticola were examined, 20 trees or 25 per cent were infected, 11 trees or 13.8 per cent had killing cankers. A large percentage of the cankers was of 1945 and some 1946 origin. In a small, unworked area along the highway immediately south of the control area, 35 P. monticola were examined, 21 trees or 60 per cent were infected, 8 trees or 22.9 per cent had killing cankers. This area was worked as a roadside strip in 1948. Comparing the canker ages and percentage of infection in the control unit with those outside the protection zones, it is readily apparent control is being accomplished.

East Glacier. On 420 chains of strip, 303 P. flexilis were examined, 20 trees or 6.6 per cent were infected with only one having a killing canker. Latest infection found was of 1941 origin. It should be recognized, however, that disease inspection is more difficult on this specie than on P. monticola due to thickness of bark and thick bunching of needles.

Two Medicine. On 375 chains of strip, 463 P. flexilis were examined, 21 trees or 4.5 per cent were infected with 2 having killing cankers. Only two cankers were found of later than 1943 infection, both of 1945 origin. On 46 P. flexilis examined just outside the control boundary, 16 trees or 34.8 per cent were infected, 2.2 per cent had killing cankers. Most of the cankers are of 1944, 1945, and 1946 origin, indicating infection is increasing rapidly in the unprotected stands.

Oldman Lake. On 737 chains of strip 2,585 P. albicaulis were examined, 48 trees or 1.8 per cent were infected, 9 had killing cankers. Most of the infection is concentrated in young pine on the east side of the area. In the reproduction area, the 470 trees inspected show 6.4 per cent infected, 1.1 per cent with killing cankers. Only three cankers were later than 1942 origin but as ribes eradication did not begin until 1946, it is believed additional infection is present yet not apparent.

RECOMMENDATIONS

Park Headquarters and Lake McDonald. In 1951, the small portions now classified as post check and rework should be inspected. Only small amounts of rework are anticipated in the future.

Two Medicine. No ribes eradication work in 1949. Check and rework necessary portions in 1950 as previously recommended. It is believed future maintenance workings will be facilitated by the use of chemical sprays, especially in handling the ribes seedling condition.

East Glacier. Due to snow conditions, ribes eradication work has not been possible in the Oldman Lake unit until July 4 to 10. In order to obtain a good crew, men should be hired when they become available in June. This crew should be trained and worked in the East Glacier area until the Oldman Lake unit is accessible in July. A considerable portion on the East Glacier area can be covered while training crews in the use of chemical equipment and other methods. This will take care of much of the work previously considered for 1950. Chemical treatment will cause less soil disturbances than grubbing methods which are partially responsible for the seedling problem. As the disease is already present in this small and sparsely populated white pine stand, all potential sources of infection should be eliminated as soon as possible.

Oldman Lake. The following recommendation is made for 1949 for the Oldman Lake area: For a complete $2\frac{1}{2}$ months' period starting as early in July as weather permits, a crew of 23 men, 1 experienced foreman and 1 experienced superintendent. The hormone chemical 2,4,5-T will be available in 1949. It is recommended six Hi-Fog guns be purchased for its use. The chemical will be used on ribes as an aerial spray. Treat chemically the 80 acres of *R. lacustre* concentrations at the east control boundary on the south side of Dry Fork Creek. Complete the two small unfinished cliff areas in the south side cliffs using 2,4,5-T in oil applied with Hi-Fog guns. Using chemical methods where possible, rework the reproduction and pole areas on the east side of the control unit. Perform canker elimination in the reproduction stand during inclement weather when ribes eradication work is not practicable.

During the summer of 1948, representatives of the National Park Service and the Bureau of Entomology and Plant Quarantine visited the cliff and upper lake area comprising about 150 acres of spectacular *P. albicaulis* on the south side of the Oldman Lake control area. There was some question as to whether the area had been considered a part of the control unit. The Bureau has unqualifiedly recommended the working of this area, since failure to do so would nullify protection efforts on the rest of the area. Working of this area in 1949 will not increase the above personnel estimates. It is believed that chemical methods will increase production to the extent that chemicals and equipment will be the only additional requirement.

CONCLUSION

The Glacier National Park blister rust control program as recommended for 1949 is designed to lessen the seedling problem at East Glacier and to complete the difficult initial work remaining at Oldman Lake. The hormone chemical 2,4,5-T should serve to decrease the amount of future rework in all control areas of the park. It is believed that after the Oldman Lake area is complete, only a small maintenance crew will be required to keep the control units on a good protection basis.

At the request of National Park Service officials for revised future white pine blister rust control estimates, the following plan is recommended through 1953,

based on the assumption that all 1949 work will be completed. Some modification of these estimates may be necessary, depending upon the success of chemical methods. The amount of ribes eradication necessary following 1953 will depend to a large extent on the effectiveness of chemical methods on seedling areas.

During the next several field seasons a 6- to 10-man maintenance crew under the direction of a competent superintendent should be employed to conduct surveys and to perform ribes eradication work where necessary. The crew could progressively cover all control units over a period of years, which may be more satisfactory than attempting to maintain control standards with a larger crew at periodic intervals.

1950 - 6 men and 1 superintendent for 3 months - Two Medicine

1951 - 6 men and 1 superintendent for 3 months - East Glacier

1952 - 6 men and 1 superintendent for 3 months - Park Headquarters and
Lake McDonald

1953 - 10 men and 1 superintendent - Oldman Lake

RESULTS

The following tables show statements of expenditures, results of the 1948 field work, and accumulative results for all work performed to date:

TABLE 1

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1948 GLACIER NATIONAL PARK

Item	National Park Service
Personal Services	\$22,545.46
Travel & Transportation	74.17
Communication Service	7.40
Other Structural Services	2,338.22
Supplies & Materials	12.82
Equipment	16.64
Salary & Expense, Checkers	1,469.07
Total	\$26,463.78

TABLE 2

SUMMARY OF RIBES ERADICATION, 1948
GLACIER NATIONAL PARK

Area	Working	Acres	Man-Days	Ribes Species			Total Ribes	Per Acre	
				Ribes lacustre	Ribes viscosissimum	Ribes setosum		Man-Days	Ribes
Park Headquarters	First	9	5	30			30	.56	3
	Other	440	119	4,498	1,386	2,220	8,104	.27	18
	Total	449	124	4,528	1,386	2,220	8,134	.28	18
Lake McDonald	Second	580	391	14,965	13,925	397	29,287	.67	50
	Other	874	644	8,439	1,000	468	9,907	.74	11
	Total	1,454	1,035	23,404	14,925	865	39,194	.71	27
Oldman Lake	First	382	923	56,381		444	56,825	2.42	149
All Areas	First	391	928	56,411		444	56,855	2.37	145
	Second	580	391	14,965	13,925	397	29,287	.67	50
	Other	1,314	763	12,937	2,386	2,688	18,011	.58	14
	Total	2,285	2,082	84,313	16,311	3,529	104,153	.91	46

TABLE 3

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1939-1948
GLACIER NATIONAL PARK

Class	Acres	Man Days	Total Ribes	Per Acre	
				Man Days	Ribes
NP-Reg	5,199	5,957	539,742	1.15	104
NP-CCC	2,633	2,833	323,841	1.08	123
NP-CPS	2,776	2,285	214,156	.82	77
Total	10,608	11,075	1,077,739	1.04	102

TABLE 4

SUMMARY OF RIBES ERADICATION, 1939-1948
GLACIER NATIONAL PARK

Area	Working	Acres	Man-Days	Ribes Species				Total Ribes	Per Acre	
				Ribes lacustre	Ribes viscosissimum	Ribes setosum	Ribes inermis		Man-Days	Ribes
Park Headquarters	First	690	450	32,738	43,176	32,986		108,900	.65	158
	Second	619	201	3,277	2,518	1,195	2	6,992	.32	11
	Other	701	379	6,660	5,064	3,284		15,008	.54	21
	Total	2,010	1,030	42,675	50,758	37,465	2	130,900	.51	65
Two Medicine	First	707	1,243	74,509	4,193	6,388	23,072	108,162	1.76	153
	Second	685	739	84,693	2,498	4,631	33,679	125,501	1.08	183
	Other	366	340	52,188	1,501		12,596	66,285	.93	181
	Total	1,758	2,322	211,390	8,192	11,019	69,347	299,948	1.32	171
Lake McDonald	First	1,777	1,201	43,036	4,289	35,777		83,102	.68	47
	Second	1,777	1,080	29,142	15,455	19,211		63,808	.61	36
	Other	1,216	849	13,121	1,126	1,843		16,090	.70	13
	Total	4,770	3,130	85,299	20,870	56,831		163,000	.66	34
East Glacier	First	446	1,289	46,129	15,236	11,712	111,862	184,939	2.89	415
	Second	388	720	37,434	5,497	30,577	2,385	75,893	1.86	196
	Other	86	174	13,373	578	1,633	275	15,859	2.02	184
	Total	920	2,183	96,936	21,311	43,922	114,522	276,691	2.37	301
Oldman Lake	First	1,150	2,410	206,654	102	444		207,200	2.10	180
All Areas	First	4,770	6,593	403,066	66,996	87,307	134,934	692,303	1.38	145
	Second	3,469	2,740	154,546	25,968	55,614	36,066	272,194	.79	78
	Other	2,369	1,742	85,342	8,269	6,760	12,871	113,242	.74	48
	Total	10,608	11,075	642,954	101,233	149,681	183,871	1,077,739	1.04	102

BLISTER RUST CONTROL, YELLOWSTONE NATIONAL PARK, 1948

By

J. C. Gynn, Operation Supervisor

C. M. Chapman, Pathologist

Ribes eradication for the control of white pine blister rust in Yellowstone National Park during 1948 was performed on the Mammoth and Mount Washburn areas. A four per cent check was made of all 1947 eradication work in the Craig Pass area. An advance check was completed on all unworked areas in the Mount Washburn unit.

Mammoth. Acres worked 1,480, man-days per acre .47, ribes removed per acre 59. Work started June 2 and continued until July 14. Before working, the entire area of 1,578 acres was checked. The check showed 1,480 acres needed rework, about half of which required intensive working. Most ribes eradicated were small bushes and seedlings in areas of heavy original ribes populations. The Ribes petiolare reoccurring on Glen Creek, Clematis Gulch, and Cabin Creek were treated with 2,4-D applied as an aerial spray. From a four per cent check made after working, the area was classified as follows: 1,130 acres on maintenance with 450 acres in the post check category. Nearly all areas classified for future checking present a R. petiolare and R. setosum seedling problem. These areas will require close inspection and checking in several years. It is believed that most future ribes seedling eradication work can be accomplished with chemicals at greatly reduced costs.

Completion of the work was retarded considerably by an unusually high, early season turnover of personnel. As the area was approaching a maintenance standard presenting only a small bush and seedling problem, loss of the well chosen men originally hired was a severe blow to the project. June rains also hindered the work. Ribes eradication was attempted during wet periods but proved unsatisfactory and made rework necessary later in the season. These two conditions resulted in 2 weeks' delay in completing the area.

Mount Washburn. Acres worked 487, man-days per acre 1.63, ribes removed per acre 174. On completion of the Mammoth area July 14, the crew was moved to Canyon where work started on Mount Washburn July 15. The crew, with a foreman and a superintendent, averaged 35 men until August 15, after which men began leaving for school or other work. All work was confined to heavy R. montigenum areas adjacent to the 1947 work limits at Dunraven Pass. A check in 1947 showed this area supported the heaviest ribes population of any portion of the entire area. Both hand eradication and chemical methods were employed. Spraying of R. petiolare on Carnelian Creek with 2,4-D was completed. Eight hundred and forty-one gallons of Ammate applied as an aerial spray were used on some of the heavy concentrations of R. lacustre and R. montigenum. By the end of the season, man-day requirements had decreased from 5 man-days per acre in the heavy ribes concentrations to less than a man-day per acre in lighter areas where the one-man drag line method could be used. A four per cent check showed a good quality work. The 1948 work was classified as follows: 417 acres on post check with 70 acres requiring rework.

The advance check completed on the protection zone along the east boundary indicates that nearly the entire area will require working.

Due to the late start, the small crew on hand after August 15, and time lost because of rain and fire, only 793 effective man-days were obtained from an estimated possible 1,980. As a result, accomplishments were far less than anticipated.

There are approximately 1,700 acres of unworked area remaining in the unit. The chemical 2,4,5-T gives every indication of being effective on R. montigenum. It is believed this chemical used as an aerial spray will be of great assistance in completing the area.

Craig Pass. A four per cent check was made on all 1947 workings. The data show that a good quality of work was accomplished. This area is now classified as follows: Maintenance 3,260 acres, and only 60 acres requiring rework. All rework areas represent seedling spots.

BLISTER RUST INFECTION

No blister rust infection was found on white pine in Yellowstone National Park in 1948. A total of 4,240 trees was examined, 2,100 in the Mammoth area, 1,400 at Mount Washburn, and 740 in the Craig Pass area.

Blister rust was found on R. petiolare 3 miles north of Mammoth Hot Springs on Slide Lake Creek. The following areas were examined for infection with negative results: Gardiner River, Lava Creek, Glen Creek, Clematis Gulch, Antelope Creek, Carnelian Creek, Dunraven Pass and vicinity, Tower Falls Creek near junction with the Yellowstone, and Craig Pass-Isa Lake and vicinity.

RECOMMENDATIONS

Mammoth and Craig Pass. No ribes eradication work in the 1949 season.

Mount Washburn. Complete initial work in the control unit. Check all 1947 work classified as post check. After completing initial work, start reworking the 1946 and 1947 areas as shown necessary by the checking data. Use chemical methods wherever possible in both the stream type and upland areas. Use the one-man drag line system when hand ribes eradication methods are necessary.

The following estimate is made for 1949 for the Mount Washburn area: For a complete 3-month period starting approximately June 13 a crew of 34 men, 1 foreman (SP-6), and 1 superintendent (SP-7).

In order to assure obtaining the total estimated effective man-days possible during the working period, it is recommended eight additional laborers be hired at the start to take care of time lost from rain, fire, crew reductions, and other unforeseen circumstances.

The above program is designed to complete all initial ribes eradication and bring up to date the rework necessary on areas initially worked in 1946 and 1947 in the Mount Washburn control unit.

At the request of National Park Service officials for future blister rust control cost estimates in Yellowstone National Park, the following plan is recommended for consideration:

During several field seasons following 1949, a 6- to 10-man maintenance crew under the direction of a competent superintendent should be employed to conduct checking surveys and perform ribes eradication work as necessary. The crew could progressively cover all control areas over a period of years, which may be more satisfactory than attempting to maintain control standards with a 30-man crew at periodic intervals.

1950 - 10 men and 1 superintendent for 3 months - perform any necessary rework on Mount Washburn in areas receiving initial eradication in 1948 and 1949.

1951 - 6 men and 1 superintendent for 3 months - Craig Pass seedling areas - respraying on Carnelian Creek.

1952 - 6 men and 1 superintendent for 3 months - seedling areas at Mammoth.

1953 and 1954 - 6 men and 1 superintendent for 3 months - progressively reworking any areas necessary as shown by future inspections and post checks on the Mount Washburn area.

In outlining this maintenance program, it is assumed the 1949 program will be completed as recommended.

RESULTS

The following tables show statements of expenditures, results of the 1948 field work, and accumulative results of all work done to date:

TABLE 1

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1948
YELLOWSTONE NATIONAL PARK

Item	National Park Service
Personal Services	\$19,823.77
Travel & Transportation	79.77
Communication Service	5.25
Other Structural Services	3,497.80
Supplies & Materials	643.91
Equipment	734.25
Salary & Expense, Checkers	769.14
Total	\$25,553.89

TABLE 2
SUMMARY OF RIBES ERADICATION, 1948
YELLOWSTONE NATIONAL PARK

Area	Working	Acres	Man-Days	Ribes Species						Total Ribes	Gallons Spray	Per Acre	
				Ribes lacustre	Ribes viscosissimum	Ribes petiolare	Ribes setosum	Ribes cereum	Ribes montigenum			Man-Days	Ribes
Mammoth	First	2	2			200				200		1.00	100
	Second	1,326	496	6,286	1,727	5,707	51,564	3,462		68,746	561	.37	52
	Other	152	204		417	4,090	12,880	1,567		18,954	409	1.34	125
	Total	1,480	702	6,286	2,144	9,997	64,444	5,029		87,900	970	.47	59
Mt. Washburn	First	487	793	56,371	853	8,618			18,958	84,800	1,700	1.63	174
All Areas	First	489	795	56,371	853	8,618			18,958	85,000	1,700	1.63	174
	Second	1,326	496	6,286	1,727	5,707	51,564	3,462		68,746	561	.37	52
	Other	152	204		417	4,090	12,880	1,567		18,954	409	1.34	125
	Total	1,967	1,495	62,657	2,997	18,615	64,444	5,029	18,958	172,700	2,670	.76	88

TABLE 3
SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1945-1948
YELLOWSTONE NATIONAL PARK

Class	Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
					Man-Days	Ribes
NP-Reg.	7,443	5,435	649,817	4,827	.73	87
NP-CPS	1,567	992	95,769	765	.63	61
Total	9,010	6,427	745,586	5,592	.71	83

TABLE 4
SUMMARY OF RIBES ERADICATION, 1945-1948
YELLOWSTONE NATIONAL PARK

Area	Working	Acres	Man-Days	Ribes Species							Total Ribes	Gallons Spray	Per Acre	
				Ribes lacustre	Ribes viscosissimum	Ribes petiolare	Ribes inerme	Ribes setosum	Ribes cereum	Ribes montigenum			Man-Days	Ribes
Mammoth	First	1,580	1,040	8,322	2,331	19,190		63,001	12,215		105,059	1,646	.66	66
	Second	1,478	563	6,286	1,727	8,002		55,042	4,083		75,140	736	.38	51
	Other	152	204		417	4,090		12,880	1,567		18,954	409	1.34	125
	Total	3,210	1,807	14,608	4,475	31,282		130,923	17,865		199,153	2,791	.56	62
Mt. Washburn	First	2,480	4,228	128,992	3,881	19,926	381			370,770	523,950	2,801	1.70	211
Craig Pass	First	3,320	392	7,599	2,962		2,340			9,582	22,483		.12	7
All Areas	First	7,380	5,660	144,913	9,174	39,116	2,721	63,001	12,215	380,352	651,492	4,447	.77	88
	Second	1,478	563	6,286	1,727	8,002		55,042	4,083		75,140	736	.38	51
	Other	152	204		417	4,090		12,880	1,567		18,954	409	1.34	125
	Total	9,010	6,427	151,199	11,318	51,208	2,721	130,923	17,865	380,352	745,586	5,592	.71	83

BLISTER RUST CONTROL, ROCKY MOUNTAIN NATIONAL PARK, 1948

By

J. C. Gynn, Operation Supervisor

At the request of the National Park Service and as recommended by the Bureau of Entomology and Plant Quarantine, 16 chemical ribes eradication test plots were established in Rocky Mountain National Park in 1948. The purpose of the tests was to determine in that particular locale the susceptibility of the various ribes species present to the hormone chemicals 2,4-D and 2,4,5-T, and to what extent chemicals might be used in ribes eradication on the Longs Peak-Estes Cone blister rust control area.

TEST PLOTS ESTABLISHED

Ribes Species	Date Treated	Spray Unit	Chemical Formulation		
			Chemical	Ratio	Carrier
R. montigenum	July 2	Knapsack	2,4,5-T	2,000 p.p.m.	Water
R. montigenum	July 2	Hi-Fog Gun	2,4,5-T	1 to 19	Kerosene
R. montigenum	July 2	Hi-Fog Gun	2,4,5-T	1 to 39	Kerosene
R. coloradense	July 2	Knapsack	2,4-D	2,000 p.p.m.	Water
R. coloradense	July 2	Knapsack	2,4,5-T	2,000 p.p.m.	Water
R. coloradense	July 2	Hi-Fog Gun	2,4,5-T	1 to 39	Kerosene
R. lacustre	July 2	Knapsack	2,4,5-T	2,000 p.p.m.	Water
R. setosum	July 3	Hi-Fog Gun	2,4,5-T	1 to 19	Kerosene
R. setosum	July 2	Hi-Fog Gun	2,4,5-T	1 to 39	Kerosene
R. setosum	July 3	Knapsack	2,4,5-T	2,000 p.p.m.	Water
R. cereum	July 3	Hi-Fog Gun	2,4,5-T	1 to 19	Kerosene
R. cereum	July 3	Hi-Fog Gun	2,4,5-T	1 to 39	Kerosene
R. cereum	July 3	Knapsack	2,4,5-T	2,000 p.p.m.	Water
R. cereum	July 3	Hi-Fog Gun	2,4-D	1 to 9	Kerosene
R. cereum	July 3	Hi-Fog Gun	2,4-D	1 to 19	Kerosene
R. cereum	July 3	Knapsack	2,4-D	4,000 p.p.m.	Water

p.p.m. - parts per million

RESULTS

All plots were inspected September 23 and the following observations made: Ribes coloradense, resistant to 2,4-D but highly susceptible to 2,4,5-T. All R. coloradense sprayed with 2,4,5-T were completely dead, both in aerial and root portions.

All other species, R. montigenum, R. lacustre, R. setosum, and R. cereum, showed similar effects regardless of chemical or concentration applied. No growth activity above the crown was noted as having occurred since treatment. All species showed some deterioration above the crown. Roots appeared normal. Adventitious buds were present at the crown but in much smaller numbers than on untreated bushes.

CONCLUSION

DEVELOPMENTAL WORK IN METHODS OF RIBES ERADICATION, AND PROGRESS OF RIBES
ECOLOGY AND DISEASE CONTROL STUDIES IN THE NORTHWESTERN REGION FOR 1948

By

V. D. Moss, Forest Ecologist; R. T. Bingham, Agent; and
H. R. Offord, Pathologist

FOREWORD

Activities of the development and improvement project BLR-1-6 for the calendar year of 1948 included office, laboratory, greenhouse, and field work. This year several projects in both the Northwestern and Pacific Coast Regions considered to be of greatest interest to the control operations are jointly reported in the summary section.

1. Improvement of Chemical Methods for Ribes Eradication in 1947
2. Herbicides Tested in 1948
3. Helicopter Tests
4. Ecological Studies of Ribes and Western White Pine
5. Developmental Work on Disease Survey Methods

CHEMICAL INVESTIGATIONS

Tests of 2,4-Dichlorophenoxyacetic and 2,4,5-Trichlorophenoxyacetic Acids for Ribes Eradication in the Western White Pine Region

Improvement of chemical methods for ribes eradication in 1947. Chemical tests established in 1947 were examined this season to determine the comparative effectiveness of the two plant growth-regulators 2,4-D and 2,4,5-T in relation to ribes species, chemical concentration, dosage rate, site, and seasonal changes in growth development of ribes. A total of 153 spray and dust plots was treated on the four north Idaho forests, 33 plots on the Clearwater, 46 on the St. Joe, 45 on the Coeur d'Alene, and 29 on the Kaniksu. In addition, 28 decapitation tests were made, 16 plots on the Coeur d'Alene, and 12 on the St. Joe Forest. Results showed 2,4,5-T to be surprisingly effective on Ribes lacustre, R. inerme, and R. viscosissimum species which have been moderately to highly resistant to 2,4-D. Lateness in receiving 2,4,5-T compounds in 1947 left much to be investigated by subsequent tests in 1948. However, the 1947 tests revealed two important facts: (1) that ribes species heretofore resistant to 2,4-D were susceptible to 2,4,5-T, and (2) that the effectiveness of this chemical was dependent upon the spray solution being applied to the root crown, canes, lower and upper leaf surfaces, and tips of growing stems. The decapitation studies showed that a 5 per cent or 10 per cent oil or aqueous solution of 2,4-D was effective on R. viscosissimum and R. lacustre providing stems were severed within 1 inch of the root crown. These results on R. lacustre and R. viscosissimum were given general confirmation by plots established in Oregon on these ribes species.

Herbicides tested in 1948. Late season check of field plots showed that the four major ribes species, R. petiolare, R. inerme, R. lacustre, and R. viscosissimum in the western white pine region are susceptible to the plant growth-regulator 2,4,5-T. The 1948 program involved establishing 178 spray tests on the Coeur d'Alene National Forest and Kaniksu National Forest. A series of tests involving dosage, concentration, carriers and spreaders, 2,4-D and 2,4,5-T combination

sprays, and 2,4,5-T acid dissolved in tributyl phosphate were replicated in early season, midseason, and fall season. The early season tests on R. lacustre and R. viscosissimum resulted in a kill this season unexcelled in effectiveness by any chemical previously used. Whether the susceptibility of these two species will vary with seasonal changes in growth development of ribes and the relation of susceptibility to chemical concentration and dosage rate cannot be finally determined until the 1948 tests are examined early next season. The importance of obtaining proper coverage of a bush with spray solution was clearly demonstrated by current work. The four plant parts which must be properly treated and the order in which they should be sprayed are: (1) direct treatment of root crown for coverage of adventitious buds and secondary roots near ground surface (an exception is broadcast spraying of ribes seedlings, plants 3 years old and younger), (2) thorough coverage of all canes, (3) complete wetting of lower and upper leaf surfaces, and (4) final application of spray to tips of all growing stems. Mature bushes should be sprayed from at least two sides in order to obtain uniform coverage with spray solution. The time needed to treat the stems can be minimized by holding nozzle about a foot away from bush and making a general coverage of a number of stems at one time. A generous volume of dilute aqueous solution applied with power or knapsack as a coarse spray is recommended for treating R. lacustre and R. inerme. A mist spray of high concentration or a coarse spray of low concentration are equally effective on R. petiolare and R. viscosissimum. A five per cent oil or aqueous solution of 2,4,5-T was found more effective for treatment of decapitated ribes than 2,4-D. Chemical should be brushed liberally on stubs and cut portions of stems when bush is decapitated more than 1 inch from root crown. Rapid development of chemical methods for using 2,4,5-T made it possible to jointly start and supervise large scale practical spray jobs on all control operations in 1948.

Helicopter tests. The first tests of the helicopter for spraying ribes with 2,4-D were made on the Sierra National Forest, California, June 21-25, 1948. A Bell model 47B-3, equipped with a 44-nozzle boom, was effectively flown within 30 feet of the ground at elevations of 5,200 - 6,000 feet. The maximum load carried was 20 gallons. Thirty-eight acres were sprayed with 575 gallons of herbicide at ground speeds of about 30 m.p.h. Eighteen plots (from 1 to 5 acres) were treated with 16 dosages of the following 2,4-D formulations: Isopropyl ester in Diesel oil, aqueous isopropyl ester plus a sticker-spreader, aqueous alkanolamine, aqueous ammonium salt plus summer oil plus sticker-spreader. Dosages per acre were from 5 to 30 gallons and from 3.4 to 53.4 ounces 2,4-D acid.

Observations 6 weeks after treatment showed that 2,4-D ester in Diesel oil was generally more toxic to ribes and associated brush than the esters or salts diluted with water. Oil solutions apparently settle and wet the vegetation with greater uniformity than aqueous solutions. The apparent kill could be correlated with the dosage of 2,4-D used. Sixteen ounces of 2,4-D acid or more per acre caused significant damage to R. roezli and R. nevadense and to other susceptible plants. Damage to ribes was spotty whenever they were screened by other vegetation. This screening effect was noticeable when associated brush had a density of three-tenths or more. In general, the apparent kill of ribes and of susceptible brush correlates closely with the density of spray deposit recorded by test plates. Discs of filter paper gave an excellent record of spray deposit for aqueous solutions dyed red; glass plates were best for recording oil

solutions. Most uniform coverage was obtained on plots where slope and ground obstructions permitted spraying from two opposing directions.

ECOLOGY STUDIES

Ecological studies of ribes and western white pine. Ecologic work has related to essential activities in the maintenance of field plots and to cooperation with Federal, state and private foresters by attending timber management conferences and by on-the-ground inspections of ribes and white pine in timber sale areas. Encouraging progress has been made by all agencies concerned in correlating ribes ecology and pine management through cutting practices, slash disposal, and other means.

Developmental work on disease survey methods. Disease survey methods developed during 1946 and 1947 have been used advantageously during the past season in designing and conducting a large scale white pine stocking-blister rust loss survey for the U. S. Forest Service. The field survey makes use of a systematic sample composed of lines of 1/500-acre quadrats laid across both major and minor drainages at an interval of 10 or 20 chains. Crop tree stocking by species is tallied for every quadrat on the sample line. The time consuming and costly examination for blister rust losses to white pine crop tree stocked quadrats is restricted to a subsample composed of about one-tenth as many quadrats as are inspected for stocking. The subsample is composed of the first white pine crop tree occupied quadrats encountered in each of the ten-quadrat transects along the sample line. When an existing white pine crop tree and all its potential replacements within the quadrat are found to have trunk or potentially damaging branch cankers, a loss in stocked area due to blister rust is tallied, distinguishing between quadrats which will eventually be restocked by potential crop trees of other species and quadrats which will revert to an unstocked condition. Climbers are used in the examination of pole-sized white pines.

The new survey was applied during 1948 to areas within more than 100 of the approximately 350 white pine working units comprising the region's Forest Service blister rust control area. More than 50 surveymen and 6 supervisory personnel were trained and employed in obtaining information used in the analyses being made on the working units. Over 1,000 miles of survey strip were run. The survey was found to be relatively expensive due to the careful training required for surveymen and to the necessity of climbing pole-sized trees in order to make a thorough examination. Uniformity in survey work throughout the region and accuracy of survey results will strengthen decisions made in regional planning for white pine management.

FIELD WORK

IMPROVEMENT OF CHEMICAL METHODS FOR RIBES ERADICATION IN 1947

Herbicides tested included the plant growth regulators 2,4-dichlorophenoxyacetic and 2,4,5-trichlorophenoxyacetic acid. Tests were begun June 5, continued intermittently through the summer season, and terminated on September 3. Concentrates were applied in small dosages as mist spray with the Hi-Fog gun. Heavy dosages of low concentrations were applied as coarse spray with the knapsack unit. Nearly all tests were replicated on each of the four north

Idaho forests. The majority of tests were on R. viscosissimum and R. lacustre, with some attention given to the treatment of R. inerme and R. petiolare.

In the Hi-Fog gun tests the herbicide was applied to ribes by wetting canes, lower and upper leaf surfaces, and tips of growing stems. No direct crown application was made to cover adventitious buds and drench secondary roots close to the ground surface. Thorough coverage of the basal portion of the bushes was not emphasized in the 1947 tests as it was thought the chemical would be readily translocated to the roots in lethal amounts from stems and leaves. With the knapsack sprayer tests the chemical solution was applied uniformly over one square milacre and to all aerial plant growth. Differences in spraying technique are mentioned to draw attention to the fact that variation in results between knapsack and Hi-Fog gun tests is believed due to (1) spraying methods and (2) dosage rates. This topic is further elaborated upon in discussing the results of individual tests.

The results in testing some special 2,4-D formulations are not included in the tables for the reason no bush or live stem kill occurred. One of these special formulations is known as King's formula in which various proportions of glycerol, potassium chloride, and ammonium phosphate are added to an aqueous solution of the ammonium salt of 2,4-D. Another was the addition of onion extract to an aqueous solution of the sodium salt of 2,4-D. This onion extract, according to one authority, was supposed to increase the toxicity of the hormone. Along with these two spray formulations, the 2,4-D dusts proved to be noninjurious to either R. viscosissimum or R. lacustre. Tests showing results of more practical interest will be discussed by individual forests.

Clearwater. Plots 15 to 29 in table 1 represent a series of midseason tests applied with the Hi-Fog gun. Differences in the effectiveness of 2,4-D and 2,4,5-T on R. lacustre are noticeably demonstrated by the results. The incomplete bush kill resulting from 2,4,5-T is believed largely due to not applying spray solution to the root crowns for coverage of adventitious buds and secondary roots near ground surface. Why some bushes were killed and others not is difficult to understand. The possibility that one bush may have received a heavier dosage and better coverage than another, or the fact that bushes of a single species may vary in the degree of susceptibility to the chemical hormones must all be considered. Plots 32 and 33 are practical tests conducted by the Bureau Clearwater operation. The results are comparable to those from methods tests at the same concentration of chemical.

St. Joe. Two seasonal series of tests (plots 24 to 46 in table 1) were made with the Hi-Fog gun on this forest, one July 16 and the other August 18. Ribes lacustre bushes ranged in age from 15 to 25 years old with live stem averaging around 200 feet per ribes. The fact that these plants were old and that spray solution was not applied to root crowns probably accounts for the low per cent bush kill. In most cases, live stem was killed to ground level. Resprouting this season was from old adventitious buds. Later studies demonstrated the importance of applying spray solution directly to the crown to prevent new stem development from adventitious buds. In this series tests, better results were obtained with the ethyl ester of 2,4,5-T in the diluent stove oil than in kerosene.

The results from two dust applications on R. petiolare overlooked in reporting 1947 tests were of interest this season. Five and 15 per cent isopropyl ester dusts of 2,4-D were applied to the leaves and stems of R. petiolare. Both gave 100 per cent kill. For any future first working of stream type having heavy concentrations of R. petiolare the use of 2,4-D dust should be considered.

Coeur d'Alene. Upon receiving two formulations of 2,4,5-T from the Zehrunge Chemical Company, Portland, Oregon, initial tests in the region were begun on this forest July 8 with the Hi-Fog gun treatment of R. lacustre on plots 1-8. Plots 1 to 4 were treated with an amine salt of 2,4,5-T in an aqueous solution, and plots 5 to 8 with the ethyl ester in the diluent kerosene. Bush kill was considered surprisingly good in view of the fact that no chemical solution was applied to root crowns. Plots 14 to 21 compared 2,4-D and 2,4,5-T on R. viscosissimum and resulted in a higher per cent bush kill with 2,4,5-T than with 2,4-D. Here again kill occurred without direct treatment of root crowns.

The next series of tests, plots 9 to 13, were made with the knapsack sprayer and tested the sodium salt of 2,4,5-T. This salt was not commercially available in 1947 and was prepared by adding anhydrous sodium carbonate to the acid of 2,4,5-T. One variation from the straight sodium salt tests was the addition of onion extract as an activator in treating plot 11. The original intention was to replicate these tests again in August and September if the July treatments a month later showed significant live stem injury. Results from the July plots, however, were most discouraging up to the beginning of the winter season. The only injury noted was about an inch die-back on tips of new stem growth. Examination of these plots the last week in October showed all bushes of both ribes species to be normal in appearance except for the stem tip die-back. Consequently, the high per cent bush kill found in the spring of 1948 was most unexpected. Apparently a slow action on ribes is typical of 2,4,5-T, especially on those bushes sprayed after the period of most rapid plant growth. Further, it is not a chemical that will kill without being properly applied. It is effective only when carefully applied to the root crowns for coverage of adventitious buds and secondary roots near ground surface, stems, lower and upper leaf surfaces, and tips of growing stems. In this series of knapsack tests, the high per cent bush kill can be attributed to proper coverage that each bush received as the spray solution was applied at a dosage rate of 1 gallon per milacre. This was more than a generous amount of solution needed to drench the root crowns and thoroughly cover the aerial portion of each bush.

From July 29 to 31, plots 22 to 41 were established in the Potter Creek drainage. Again, the results are encouraging in view of the fact that chemical solution was not applied to root crowns of ribes. In order to clear any misconception relative to the belief that mature ribes can be killed by drifting the mist spray over the bushes, note the results for plots 38 and 39. A mist spray was drifted over ribes on the lower side of a road bank, the methyl ester of 2,4-D in kerosene being applied to plot 38 and the ethyl ester of 2,4,5-T in kerosene to plot 39. Plots 40 and 41 present an interesting comparison between the effectiveness of 2,4-D and 2,4,5-T on R. lacustre. Plot 40 was sprayed with the methyl ester of 2,4-D, and plot 41 with the ethyl ester of 2,4,5-T. Whereas no kill resulted from 2,4-D, 89 per cent bush kill was obtained with 2,4,5-T.

On September 3, plots 42 to 45 were established to get some indication of the effectiveness of 2,4,5-T applied in the fall season. Note that a higher per cent bush kill resulted from these late treatments than was obtained from the late July tests of comparable concentrations of 2,4,5-T. This might be explained by the fact that the growth development of adventitious buds generally occurs from about mid-August on. Although spray solution was not directly applied to root crowns, much undoubtedly drifted downward onto adventitious stems and buds in treating aerial portions of a bush.

Kaniksu. Tests were made in the Kaniksu Forest from August 6 to 25. These tests were similar to those established on the Coeur d'Alene Forest. One exception was the treatment of two R. inerme plots, 24 and 25. Plot 24, sprayed with the ethyl ester of 2,4,5-T in kerosene, resulted in 98 per cent bush kill as compared to 67 per cent for plot 25 treated with the methyl ester of 2,4-D. The R. inerme was sprayed with the Hi-Fog gun, the mist solution being applied to stems, lower and upper leaf surfaces, and tips of growing canes. Resprouting this season was from the old adventitious buds that would have been killed if the root crown had been drenched with spray solution. The R. lacustre and R. viscosissimum tests on the Kaniksu resulted in about the same kill as was obtained on the Coeur d'Alene Forest. Considering the severity of the LaClere Creek site, the bush kill for August-treated ribes was remarkably good. To show the importance of applying spray solution to the aerial plant parts as well as to root crowns, note what happens when stems to a height of 1 foot above the ground surface and root crowns are treated, plots 17 to 20. This test was undertaken with the thought that considerable time could be saved in Hi-Fog gun spraying if treatment could be confined to low stems and root crowns. The results of one other test are believed of interest in showing the affects in applying a heavier dosage. This is plot 23 in which the spray solution was applied with a compressed air back-pack unit of 2-gallon capacity; this volume was dispersed in about 15 minutes. Consequently, the aerial portion of a bush to which treatment was confined was overtreated, with the result that the ground became fairly well drenched from solution passing by the bush or that in excess of what the leaves and stems were capable of retaining. Much of this excess solution undoubtedly hit on or near the root crowns with the result that a higher bush kill occurred than from the low volume Hi-Fog gun treatments.

Results of decapitation tests with 2,4-D are not tabulated. The 2,4-D compounds were satisfactory when bushes could be decapitated through crowns, but gave inconsistent results in treatment of severed stems. On the other hand, 2,4,5-T has proven effective on both R. lacustre and R. viscosissimum for stem treatment. However, bush should be decapitated as close to crown as possible. Consequently, 2,4,5-T hereafter will be employed in all decapitation work.

TABLE 1

RESULTS OF 1947 CHEMICAL TESTS

Plot Location	Date	Plot No.	Type of Chemical	Diluent	Ratio or	Ribes Species	Per Cent Kill	
					P.P.M.		Bush	Live Stem
Clearwater Forest	7/21	15	Amine Salt 2,4,5-T 111,000 p.p.m.	Water	1:2	lac.	71	96
						vis.	100	100
						pet.	100	100
		16			1:4	lac.	62	89
		17			1:9	lac.	57	73
		18			1:19	lac.	23	48
		19			1:39	lac.	4	11
		20		Kerosene	1:2	lac.	76	97
		21			pet.	100	100	
					1:4	lac.	63	87
					1:9	lac.	53	79
					1:19	lac.	28	54
					22	pet.	100	100
		23			1:39	lac.	6	15
	7/22	25	Kerosene	1:2	lac.	16	22	
		26		pet.	100	100		
				1:4	lac.	7	11	
				vis.	75	86		
				1:9	lac.	0	0	
				vis.	0	7		
	27	1:19	lac.	0	0			
	28	vis.	0	3				
		1:39	lac.	0	0			
		8/8	32	Kerosene	1:4	lac.	53	65
			vis.			79	84	
	33		Water	1:4	lac.	48	56	
					vis.	75	81	
pet.		100	100					
		St. Joe Forest	7/16	24	Water	1:2	lac.	50
25	1:4			lac.		67	98	
26	1:9			lac.		0	80	
27	1:19			lac.		0	85	
Middle Fork St. Maries River	28		Kerosene	1:2	lac.	25	99	
				1:4	lac.	0	91	
				1:9	lac.	0	94	
				1:19	lac.	0	93	
	8/18		32	Water	1:2	lac.	50	98
					1:4	lac.	0	93
1:9		lac.			0	74		
33		pet.	100		100			
		34	1:19		lac.	0	57	
			1:39		lac.	0	6	

(continued on following page)

TABLE 1 (continued)

Plot Location	Date	Plot No.	Type of Chemical	Diluent		Ribes Species	Per Cent Kill	
					Ratio or P.P.M.		Bush	Live Stem
St. Joe Forest Middle Fork St. Maries River	8/18	37	Ethyl Ester 2,4,5-T	Kerosene	1:2	lac.	0	86
		38			1:4	lac.	0	97
		39			1:9	lac.	0	88
		40			1:19	lac.	0	75
		41			1:39	lac.	0	83
		42				pet.	100	100
		43	Stove Oil		1:2	lac.	75	99
		44			1:4	lac.	20	89
		45			1:9	lac.	33	98
		46			1:19	lac.	56	98
Coeur d'Alene Forest Potter Creek	7/8	1	Amine Salt 2,4,5-T	Water	1:2	lac.	75	96
		2			1:4	lac.	67	92
		3			1:9	lac.	62	80
		4	Ethyl Ester 2,4,5-T	Kerosene	1:19	lac.	30	57
		5			1:2	lac.	86	97
		6			1:4	lac.	75	95
		7			1:9	lac.	59	70
		8			1:19	lac.	37	44
	7/15	9	Sodium Salt of 2,4,5-T in water applied with Knapsack Sprayer	Water	1,000	vis.	60	72
						lac.	85	88
		10			2,000	vis.	100	100
						lac.	100	100
		11			2,000	vis.	100	100
						lac.	85	97
		12			3,000	vis.	100	100
						lac.	100	100
		13			5,000	vis.	100	100
						lac.	100	100
		14	Ethyl Ester 2,4,5-T	Kerosene	1:2	vis.	98	100
		15			1:4	vis.	94	98
		16			1:9	vis.	80	93
		17			1:19	vis.	76	82
		18	Methyl Ester 2,4-D		1:2	vis.	72	68
		19			1:4	vis.	79	65
		20			1:9	vis.	66	48
		21			1:19	vis.	7	10
	7/29	22	Ethyl Ester 2,4,5-T	Kerosene	1:2	vis.	87	95
						lac.	79	92
		23			1:4	vis.	91	97
						lac.	74	86
		24			1:9	vis.	53	88
						lac.	40	55
		25			1:19	vis.	18	30
						lac.	3	5
		26			1:39	vis.	4	10
						lac.	1	4

(continued on following page)

TABLE 1 (continued)

TABLE 1 (continued)											
Plot Location	Date	Plot No.	Type of Chemical	Diluent	Ratio or P.P.M.	Ribes Species	Per Cent Kill				
							Bush	Live Stem			
Coeur d'Alene Forest Potter Creek	7/29	27	Methyl Ester 2,4-D	Kerosene	1:2	vis.	63	51			
						lac.	34	28			
		28			1:4	vis.	37	26			
						lac.	23	30			
		29			1:9	vis.	20	16			
						lac.	6	14			
		30			1:19	vis.	2	5			
						lac.	0	0			
		31			1:39	vis.	0	0			
						lac.	0	0			
		7/30			32	Amine Salt 2,4,5-T	Water	1:2	vis.	83	94
									lac.	75	78
					33			1:4	vis.	80	95
									lac.	68	70
	34		1:9	vis.	44			87			
				lac.	26			20			
	35		1:19	vis.	12			35			
				lac.	3			5			
	36		1:39	vis.	5			18			
				lac.	0			2			
	38		Methyl Ester 2,4-D	Kerosene	1:4			vis.	0	15	
								lac.	0	2	
	39		Ethyl Ester 2,4,5-T		1:4			vis.	0	40	
								lac.	0	15	
	7/31	40	Methyl Ester 2,4-D	Kerosene	1:4	lac.	0	2			
						41	Ethyl Ester 2,4,5-T	1:4	lac.	89	98
	9/3	42	Ethyl Ester 2,4,5-T	Kerosene	1:2	vis.	96	97			
						lac.	84	90			
		43			1:4	vis.	90	93			
						lac.	72	84			
		44			Methyl Ester 2,4-D	1:2	vis.	56	50		
							lac.	0	0		
	45	1:4	vis.	31	28						
			lac.	0	0						
Kaniksu Forest LaClerc Creek	8/6	1	Ethyl Ester 2,4,5-T	Kerosene	1:2	vis.	96	99			
						lac.	69	90			
		2			1:4	vis.	93	98			
						lac.	67	88			
		3			1:9	vis.	75	86			
						lac.	54	65			
		4			1:19	vis.	48	57			
						lac.	29	40			
	8/7	5	Methyl Ester 2,4-D	Kerosene	1:2	vis.	82	87			
						lac.	4	15			

(continued on following page)

TABLE 1 (continued)

Plot Location	Date	Plot No.	Type of Chemical	Diluent	Ratio or P.P.M.	Ribes Species	Per Cent Kill	
							Bush	Live Stem
Kaniksu Forest	8/7	6	Methyl Ester 2,4-D	Kerosene	1:4	vis.	65	62
		7			1:9	vis.	28	42
LaClere Creek		8			1:19	vis.	7	20
						lac.	0	0
	8/12	9	Amine Salt 2,4,5-T	Water	1:2	vis.	72	84
		10			1:4	vis.	56	48
		11			1:9	vis.	25	20
		12			1:19	vis.	14	11
	8/14	13	Ethyl Ester 2,4,5-T	Fuel Oil	1:4	vis.	91	95
		14			1:9	vis.	77	83
		15	Methyl Ester 2,4-D		1:4	vis.	85	80
		16			1:9	vis.	58	45
		17	Ethyl Ester 2,4,5-T	Kerosene	1:4	vis.	7	10
		18			1:9	vis.	2	4
		19	Methyl Ester 2,4-D		1:4	vis.	0	0
		20			1:9	vis.	0	0
	8/18	21	Butyl Ester 2,4-D	Kerosene	1:4	vis.	84	75
		22			1:9	vis.	70	63
		23	Ethyl Ester 2,4,5-T		1:4	vis.	91	92
						lac.	79	86
	8/19	24	Ethyl Ester 2,4,5-T	Kerosene	1:4	ine.	98	95
		25			1:4	ine.	67	55
	8/25	26	Ethyl Ester 2,4,5-T	Kerosene	1:4	lac.	84	92
		27			1:9	lac.	73	85
		28	Methyl Ester 2,4-D		1:4	lac.	0	0
		29			1:9	lac.	0	0

HERBICIDES TESTED IN 1948

Major emphasis this season in the development of chemical methods for ribes eradication was placed on further studies of 2,4,5-trichlorophenoxyacetic acid.

Delayed delivery of two commercially prepared 2,4,5-T formulations until mid-July in 1947 confined tests that season to late stages of ribes growth development. Consequently, many questions on methods of employing this chemical had to be carried over until 1948. One was the comparative effectiveness of different concentrations of chemical in relation to seasonal changes in growth development of ribes. Another was the type of carrier and spreader best adapted for applying 2,4,5-T as a coarse or mist spray. Further small-scale and practical tests were undertaken in the development of methods technique for applying spray solution.

An abnormally wet spring season in 1948 caused postponing the establishment of the initial chemical tests until the first week in June. Even then it was not until the middle of the month that a complete series of chemical tests was established without interruption by bad weather. Many of the early June tests made during rainy weather were established mainly in desperation to assure early season treatments at a time of most rapid ribes growth development. Although weather worked against plot establishment, on the other hand it was responsible for holding ribes growth back two to four weeks over normal years. For this reason, the mid-June tests were quite representative of early season spray treatments. The early season tests were scheduled for the time that ribes were making rapid growth. This growth stage is characterized by flowering, expansion of leaves, and most rapid extension of new stem growth. From mid-June on, the series tests of various chemical formulations were kept on a seasonal schedule. This meant replicating the early season complete series of tests in midsummer and again in the fall season. Tests were conducted on the two forests, Coeur d'Alene and Kaniksu. Except for two plots of R. inerme in the Kaniksu Forest, all other tests were on R. viscosissimum and R. lacustre.

First tests with 2,4,5-T were established June 2 in the Coeur d'Alene Forest on R. viscosissimum. The lower flowers on the racemes of this ribes species and leaves were just commencing to unfold. Considerable snow was still on the ground over north exposures in Potter Creek at this date. Weather was mostly cloudy on this day with air temperature in the lower sixties. Occasional showers fell during the day; the plots were drenched with rain about an hour after treatment.

On June 3, tests on R. lacustre were established in Cascade Creek. Plot location in this drainage is about 1,000 feet lower than the R. viscosissimum area in Potter Creek. The difference in elevation accounted for more advance growth of ribes in Cascade Creek. The R. lacustre were mostly in full bloom, plants about 75 per cent fully foliated, and new stem growth half extended. A fairly heavy rain fell the entire day of June 3 and continued through June 5. The chemical spray tests were made nevertheless to determine the influence of unsettled spring weather on the effectiveness of 2,4,5-T. At the time, it was felt unlikely that any kill would result.

By June 15, it appeared that the weather might clear; thus, preparations were made for establishing a complete series of tests on R. viscosissimum in Potter Creek. The best that could be accomplished was the treatment of five plots before another storm hit. This rainy period lasted through the next day.

The first opportunity to establish a complete series of tests under favorable weather conditions was on June 17 in Iron Creek, when the knapsack tests on R. lacustre were established. On June 18, the Hi-Fog gun tests were made. Ribes were in full bloom with sepals on lower flowers of racemes commencing to fade. Plants were mostly fully foliated with new stem growth about 75 per cent extended. Sky was partly cloudy on June 17, but cleared by June 18. Air temperature ranged from the upper sixties to lower seventies over the two days.

Returning to the Coeur d'Alene Forest June 28, a series of knapsack plots was established on smaller and younger R. lacustre than had been previously treated around mid-June in Iron Creek. It was decided to treat these plots after observing the mid-June tests on older bushes. No injury to the older bushes had occurred in the 10 days since the mid-June treatments. Ribes growth development had advanced considerably during the 10-day interval. Fruits were about half developed with leaves and new stem growth mostly expanded. Weather was ideal and remained clear throughout the week. Air temperature varied from low to mid-seventies.

On June 29 and 30, 21 plots were established in Potter Creek. The ribes species was R. viscosissimum. Twelve were knapsack tests, and 10 Hi-Fog gun tests. At this time, the growth stage of ribes was approaching the end of the period of rapid growth. Fruits were in evidence on the lower portion of racemes with the few flowers remaining on the upper portion withered and faded in color. Plants were mostly fully foliated with new stem growth at least 75 per cent extended. Weather was clear both days, with air temperature around mid-seventy.

No further chemical work was done after completing the early season series of tests on the Coeur d'Alene Forest until July 21. On this and the following day, a number of tests were made at the head of LaClere Creek in the Kaniksu Forest. Twelve plots were treated with the knapsack sprayer. Nine plots were sprayed with the Hi-Fog gun. Some individual bush tests also were made with some new chemical compounds. As these are not included in table 2, they are mentioned for record purposes. For the A series of tests, 1 per cent by weight 3-amino-4-methoxyacetophenone, dissolved in aqueous morpholine, was used. For the B series of tests, 1 per cent 4-methoxy-3-nitroacetophenone in aqueous morpholine and isopropyl alcohol was used. On the rather severe LaClere Creek site, at this date, fruits of R. lacustre were fully ripe and the fruits of R. viscosissimum mature and commencing to color. Plants of both species were fully foliated with many of the lower leaves of a leathery texture. New stem growth was mostly extended with some swelling of winter buds. Weather was clear during the week, with air temperature in the lower eighties.

Returning to the Coeur d'Alene Forest July 30, the seasonal series of chemical tests were resumed with establishment of the midseason treatments. On this date, 19 R. lacustre plots were established in Iron Creek. Thirteen plots were sprayed with the knapsack unit, and six plots with the Hi-Fog gun. The next day methods work was transferred to Potter Creek where 21 R. viscosissimum plots were

treated. The herbicide was applied to three plots with a Sure-Shot Model A mist pressure sprayer of 1 quart capacity. A plastic material manufactured by B. F. Goodrich Chemical Company called Geon 31-X Latex was added to the spray solution of 2,4,5-T in the amounts of 1, 5, and 10 per cent for treatment of the 3 plots. The knapsack unit was used to spray 12 R. viscosissimum plots, and the Hi-Fog gun for 6 plots. Growth development of the two ribes species differed only in respect to fruiting. Fruits of R. lacustre had been cast, whereas fruits were now fully ripe on R. viscosissimum. Plants of both species were fully foliated with new stem growth mostly extended. Weather was clear during the week, with air temperature in the lower eighties.

Back on the Kaniksu Forest in August, 21 plots were established shortly after the middle of the month. These tests include treatment of both R. viscosissimum and R. lacustre, the former species being more prevalent than the latter in each plot. A few fruits remained on R. viscosissimum. Other than this, both species were commencing to develop growth characteristics associated with the approaching fall season. Lower leaves were beginning to fall, due largely to the severe site forcing early swelling of winter buds, and new stem growth was woody. Two tests of 2,4,5-T were made on R. inerme in Lamb Creek. Seasonal stage of growth development of this species was not quite as advanced as for R. lacustre and R. viscosissimum in LaClerc Creek. The R. inerme plots were sprayed with the knapsack unit. Weather was clear during the week, with daytime air temperature in the lower seventies. The chill of fall was very noticeable in the early forenoons.

To complete the seasonal series of tests on the Coeur d'Alene Forest, the fall season treatments were made from August 31 to September 2. Ribes lacustre plots were sprayed with the knapsack August 31 in Iron Creek, and the Hi-Fog gun on September 2. Comparative tests on R. viscosissimum in Potter Creek were made during the first two days in September. Both ribes species were about half defoliated, with winter buds mostly developed. New stem growth was woody and resembled old stem in color. Weather was clear, with air temperature in the upper sixties. Light frost had occurred by this date, in both Iron and Potter Creeks.

SOME RESULTS FROM CHEMICAL TESTS THE SEASON OF SPRAYING

In order to make available information on 2,4,5-T as rapidly as it develops, table 2 is presented to show some results from the early June tests. One point of interest from these results relates to the importance of rain prior to, during, or after spraying in respect to the effectiveness of 2,4,5-T on ribes. The tabulations in this table showing 100 per cent kill can be considered as final. Those denoting incomplete kill this year, the season of treatment, must be taken as tentative for additional mortality is expected to occur during the winter months.

The symbols of various chemical products in table 2 denote the following compounds: I.E. 2,4,5-T is Dow Chemical's 43 per cent isopropyl ester of 2,4,5-T. B.E. 2,4,-D is Sherwin-Williams' 40 per cent butyl ester of 2,4-D. Acid 2,4,5-T is a compound of our own making, formulated by dissolving one part by weight of 2,4,5-T acid in two parts tributyl phosphate. B.E. 2,4,5-T is Sherwin-Williams' 40 per cent butyl ester of 2,4,5-T. T.B.P. is tributyl phosphate.

Latex 31X is a plastic material manufactured by B. F. Goodrich Chemical Company under the trade name Geon 31-X Latex which is claimed to increase the action of hormone sprays. Fuel oil employed as a carrier is the ordinary grade used in oil stoves and furnaces. Emulsifiable oil was Standard Agricultural Chemical Company's clean-up oil, a dormant spray compound. Equipment used to apply spray solution was the knapsack unit for high volumes and the Hi-Fog gun for low volumes.

On October 7 and 8 in the Coeur d'Alene National Forest, those tests showing considerable live stem kill were further examined to determine, from the appearance of crown cambium tissue, the number of dead and live bushes. Because of the slowness with which 2,4,5-T acts on ribes, this part of the report relates primarily to early season spraying dated prior to July 1. An exception is the inclusion of a midseason series of Hi-Fog gun tests on R. viscosissimum to show results of an aqueous solution of 2,4,5-T containing an emulsive oil. Final results of spray tests having live bushes will be secured next season.

The procedure employed in checking for bush kill was as follows: All ribes were examined in knapsack milacre-square plots. In Hi-Fog gun tests, 20 ribes were inspected at random in each R. lacustre plot, and 40 bushes at random in each R. viscosissimum plot. Size of Hi-Fog gun plots varied from one-twentieth to one-tenth acre. To ascertain whether a bush was live or dead, the bark was slit with a knife to observe color, profusion of cellular division from the growth stimulant, and moisture content of the cambium and phloem layers. Stems were examined first, then the root crown of a bush.

The tendency for R. viscosissimum to respond sharply with increase in chemical concentration was brought to attention first by plots 1 to 3 in table 3. Doubling the concentration of 2,4,5-T in each case increased average bush kill by around 20 per cent. It was not until 2,000 p.p.m. was reached that the chemical accounted for 100 per cent bush kill. Bushes surviving in the 500 and 1,000 p.p.m. tests gave no indication from character of growth that further mortality might be expected to occur during the winter months.

The tendency for bush kill to climb sharply with increase in chemical concentration is not characteristic of R. lacustre, plots 4 to 9. This seems to be reasonable proof that R. lacustre is more susceptible to 2,4,5-T than R. viscosissimum, at least during the early season period of rapid growth. One bush of eight treated with 500 p.p.m. was the only survivor in the six tests of the concentration factor. The surprising thing about these tests (which were applied during a heavy rain) was the high percentage bush kill. It not only rained the day the plots were established, but over the following two days. On the basis of these tests, it can be concluded that the esters of 2,4,5-T are not materially affected by rain prior to, during, or after spraying.

The June 15 series of R. viscosissimum, plots 10 to 14, again showed increased toxicity of the herbicide, with increase in parts per million of 2,4,5-T. Bush kill climbed from 45.4 per cent at 500 p.p.m. to 95 per cent at 1,500 p.p.m. There was no appreciable difference in bush kill between the 1,500 and 2,000 p.p.m. tests, in which many bushes appear so weakened that further mortality can be expected during the winter months. The combination of 2,4,5-T and 2,4-D, plot 14, showed that addition of 2,4-D increased the effectiveness of the low

concentration of 2,4,5-T over 2,4,5-T alone. This may be due to the fact that R. viscosissimum is moderately susceptible to 2,4-D.

The early season R. lacustre knapsack series of scheduled tests were established June 17 and 18. The results of the 2,4,5-T concentration tests, plots 15 to 18, were 100 per cent bush kill, the identical record of the June 3 series, except for the one live bush in the 500 p.p.m. test. In the combination tests holding 2,4,5-T at the concentration level of 500 p.p.m. and adding 1,000, 3,000, and 5,000 p.p.m. of 2,4-D, plots 19 to 21, a lower per cent bush kill was obtained than when using 2,4,5-T alone. This indicates that the action of 2,4,5-T at the 500 p.p.m. level was interfered with by the addition of 2,4-D in the proportions shown. Upon raising the concentration level of 2,4,5-T to 1,000 p.p.m. and adding 1,000, 3,000, and 5,000 p.p.m. of 2,4-D, plots 22 to 24, the results show the two chemicals as being more compatible. The object in testing the combination sprays was to determine whether the effectiveness of low concentrations of 2,4,5-T might be retained by increasing the total concentration of herbicide with the less costly 2,4-D.

By June 28, when R. lacustre plots 32 to 35 were established, ribes had nearly reached the end of the early season period of flower, leaf, and new stem development. Results, early in October, reflect this advancement in growth in the rapidity with which bushes were killed. Note that all live stem is dead to the root crowns. It was evident from the crown cambium that considerable mortality will take place during the winter season.

The series typifying early season spray tests on R. viscosissimum was established June 29, plots 36 to 45. By and large, the results show the abrupt response with increase in chemical concentration of 2,4,5-T. The lower per cent bush kill this season of plot 39 may be a reflection of inadequate dosage for the large numbers of ribes treated with 1 gallon of chemical solution. About twice as many bushes were treated on this milacre plot as were sprayed with the same quantity of solution on plot 38, which produced the highest per cent bush kill. Mortality expected this winter on plot 39 may make the final results of these two tests about comparable.

TABLE 2

SOME RESULTS FROM 1948 CHEMICAL TESTS APPLIED
WITH THE KNAPSACK SPRAYER. OCTOBER CHECK

Plot No.	Date	Ribes Species	Chemical Formulation			Number Ribes Bushes					Feet Live Stem
			Compound	P.P.M.	Carrier and Spreader	Exam-ined	Dead		Live		
							No.	%	Cr.	St.	
1	6/2	<u>R. viscosissimum</u>	I.E.2,4,5-T	500	Water and Tergitol #7	19	11	57.9		8	235
2				1,000		22	18	81.8		4	272
3				2,000		19	19	100			264
4	6/3	<u>R. lacustre</u>		500		8	7	87.5		1	315
5				1,000		6	6	100			825
6				2,000		5	5	100			625
7				3,000		8	8	100			305
8				4,000		3	3	100			290
9				5,000		7	7	100			340
10	6/15	<u>R. viscosissimum</u>		500		42	19	45.4	3	20	416
11				1,000		21	18	85.6	1	2	305
12				1,500		20	19	95.0		1	289
13				2,000		41	39	95.2		2	382
14				500		56	41	73.2		15	537
			M.E.2,4-D	1,000							
15	6/17	<u>R. lacustre</u>	I.E.2,4,5-T	500		2	2	100			475
16 & 18				1,000		3	3	100			975
17				1,500		2	2	100			680
18				2,000		3	3	100			1,150
19				500		2				2	860
			M.E.2,4-D	1,000							
20			I.E.2,4,5-T	500		8	5	62.5	2	1	415
			M.E.2,4-D	3,000							
21			I.E.2,4,5-T	500		9	8	88.8	1		525
			M.E.2,4-D	5,000							
22			I.E.2,4,5-T	1,000		4	4	100			475
			M.E.2,4-D	1,000							
23			I.E.2,4,5-T	1,000		3	2	66.7		1	390
			M.E.2,4-D	3,000							
24			I.E.2,4,5-T	1,000		5	5	100			600
			M.E.2,4-D	5,000							
32	6/28		I.E.2,4,5-T	500		8	4	50.0	1		160
33				1,000		5	4	80.0	1		155
34				1,500		6	2	33.3	4		140
35				2,000		14	8	57.2	6		235
36	6/29	<u>R. viscosissimum</u>		500		37	24	64.8	3	10	370
37				1,000		42	28	66.6	3	11	493
38				1,500		56	55	98.2		1	750
39				2,000		105	80	76.2		25	938

(continued on following page)

TABLE 2 (continued)

Plot No.	Date	Ribes Species	Chemical Formulation			Number Ribes Bushes					Feet Live Stem
			Compound	P.P.M.	Carrier and Spreader	Examined	Dead		Live		
							No.	%	Cr.	St.	
40	6/29	<u>R. viscosissimum</u>	I.E.2,4,5-T	500	Water and Tergitol #7	36	30	83.4		6	412
41			M.E.2,4-D	1,000		84	77	91.6	1	6	816
42			I.E.2,4,5-T	500		86	85	98.8		1	794
			M.E.2,4-D	3,000							
43			I.E.2,4,5-T	500		70	63	90.0	2	5	682
			M.E.2,4-D	5,000							
44			I.E.2,4,5-T	1,000		77	69	89.6	6	1	804
			M.E.2,4-D	1,000							
45			I.E.2,4,5-T	1,000		90	90	100			947
			M.E.2,4-D	5,000							

The combination of 2,4,5-T and 2,4-D on R. viscosissimum resulted in a higher per cent bush kill than was obtained by the two comparable concentrations of 2,4,5-T alone. It is possible, therefore, that the lower concentrations of 2,4,5-T are made more effective by the addition of 2,4-D.

Table 3 shows results of some of 1948 Hi-Fog gun tests. Plots 25 to 31 are a series of early season tests on R. lacustre. Three concentration tests of 2,4,5-T in the diluent stove oil, plots 25 to 27, resulted in about the same per cent bush kill this season. It is doubtful whether live bushes on these plots will survive the winter months. The tributyl phosphate series of the 2,4,5-T acid diluted in stove oil, plots 28 to 30, gave no promise of being nearly as effective as the ester. The one test made of the ester of 2,4,5-T in an aqueous solution resulted in the highest per cent bush kill. There is some evidence that water may be a more effective carrier than oil on R. lacustre, as the latter tends to blast the leaves too quickly.

The Hi-Fog gun tests on R. viscosissimum show the ester series of stove oil and water plots to be equally effective. It is interesting to note that the per cent bush kill increased as concentration of 2,4,5-T decreased in the stove oil series where the reverse was true in the water series. The tributyl phosphate series appeared to be ineffective compared to the ester tests. No explanation can be made at this time of the 97 per cent bush kill obtained on plot 52 and the 55 and 52 per cent kill on plots 51 and 53 at a higher and lower concentration of 2,4,5-T acid.

The July 31 or midseason Hi-Fog gun tests on R. viscosissimum were checked to show results obtained from an aqueous solution of the ester of 2,4,5-T to which five per cent emulsive oil was added. This formulation is strongly favored for both power and Hi-Fog gun work. The addition of the emulsive oil to the spray solution tends to lower evaporation and facilitates spreading.

TABLE 3

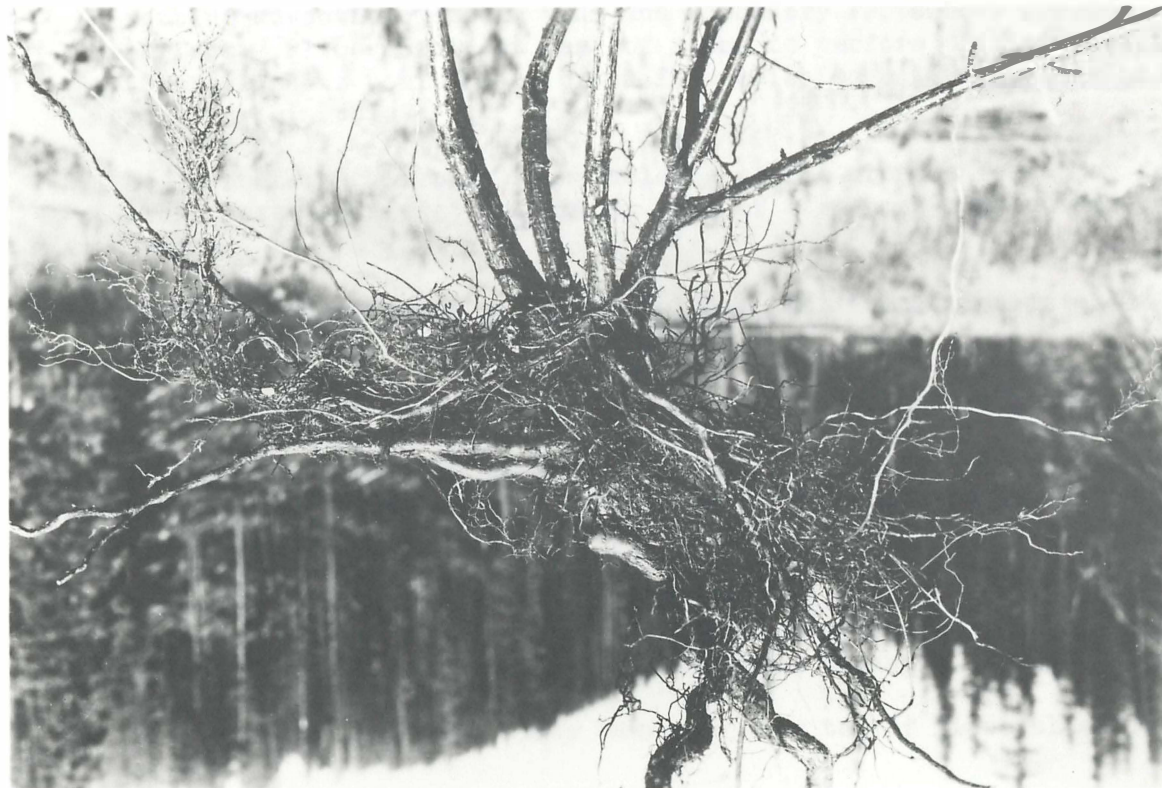
SOME RESULTS OF 1948 CHEMICAL TESTS APPLIED
WITH THE HI-FOG GUN MIST SPRAYER. OCTOBER CHECK

Plot No.	Date	Ribes Species	Chemical Formulation			Number Ribes Bushes					Feet Live Stem
			Compound	P.P.M.	Carrier and Spreader	Exam-ined	Dead		Live		
							No.	%	Cr.	St.	
25	6/28	<u>R. lacustre</u>	I.E. 2,4,5-T	21,500	Stove Oil	20	15	75.0	5		142
26				14,333		20	16	80.0	4		131
27				10,750		20	14	70.0	6		117
28			Acid 2,4,5-T	21,500	20	11	55.0	9		96	
29				14,333	20	10	50.0	10		107	
30				10,750	20	5	25.0	15		190	
31			I.E. 2,4,5-T	21,500	Water	20	18	90.0	2		114
48	6/30	<u>R. viscosissimum</u>	I.E. 2,4,5-T	21,500	Stove Oil	40	37	92.5	2	1	256
49				14,333		40	38	95.0		2	275
50				10,750		40	39	97.5	1		237
51			Acid 2,4,5-T	21,500	40	22	55.0	4	14	214	
52				14,333	40	39	97.5		1	262	
53				10,750	40	21	52.5	6	13	280	
54			I.E. 2,4,5-T	21,500	Water	40	39	97.5		1	196
55				14,333		40	37	92.5		3	228
56				10,750		40	37	92.5		3	205
110			7/31			43,000	Water & Emulsive Oil	40	40	100	
111	21,500	40				30		75.0	1	9	217
112	43,000	Stove Oil				40	29	72.5	3	8	219
113	21,500					40	28	70.0	1	11	264
114	Acid 2,4,5-T					43,000	40	21	52.5	5	14
115		21,500				40	15	37.5	1	24	220



W-568

Ribes viscosissimum: Note position on crown from which adventitious stem buds and roots originate. Essential that spray solution be applied to region on crown from which adventitious stem buds originate.



W-570

Ribes lacustre: Note adventitious buds on lower portion of stems. Others on crown are hidden from view by roots. Spray must be applied directly on crown to assure coverage of adventitious stem buds and secondary roots near ground surface. Observe how crowns of two ribes species differ morphologically - origin of stems, roots, and position of adventitious buds.

1949 RECOMMENDATIONS FOR CHEMICAL ERADICATION

These are recommendations for starting chemical eradication of ribes in 1949. After examining results of 1948 tests and practical field jobs, any revisions in recommendations for the 1949 season will be made by memorandum. Those likely to be amended are brought to attention herein.

Chemical season. Begin work as early as practical, preferably when ribes are commencing to flower, leaves expanding, and new stem growth rapidly extending. Schedule areas for working of oldest ribes, first saving areas of younger aged bushes for treatment later in the season. Chemical eradication season can probably extend into September; date of terminating work will be determined toward the end of August.

Chemical methods. Method of applying spray is based on size and age of bush. Seedlings 4 years of age and younger can be broadcast sprayed as can the small, few-leaved, older suppressed bush. Large seedlings becoming woody and mature ribes 5 years of age and older (except the small suppressed bush) must be individually treated. Method of applying spray to obtain thorough coverage of a bush determines the effectiveness of a chemical job.

Spraying individual bushes. Treat large bushes from at least two sides. Follow the four steps below in sequence, first on one side of a bush, then the other.

1. Apply chemical solution to root crown in sufficient amount to assure wetting adventitious stem buds and secondary roots near ground surface. Place nozzle at base of stems to perform this operation. (Plate 1 shows position on crown from which adventitious stem buds and roots originate).
2. Wet all stems collectively by holding nozzle about a foot away for broad coverage affect. Start at base of stems and work upward under leaves.
3. Spray lower and upper surfaces of leaves until solution is about ready to drip.
4. Finish off bush by applying spray to tips of all growing stems.

Broadcast spraying. Method differs from former in that small target of seedling ribes and suppressed bushes necessitates combining spray technique into two steps.

1. Direct spray at angle under 45 degrees from ground surface toward the ribes site or actual ribes clump. Object is to secure coverage of crowns and stems by passing spray solution at angle through foliage.
2. Finish off by applying spray downward over top of ribes clump or site.

Decapitation. Decapitate bush through or as close to crown as possible. Apply chemical solution directly to the cut crown or to cut portions of stems and to any adventitious stem buds on crown.

Chemical formulations. Use 2,4,5-T both in spray and decapitation for all ribes species in region. Chemical concentrations recommended are on the basis of the 43 per cent isopropyl ester of 2,4,5-T. Under this topic, revisions may be made during the season after examining results of 1948 tests. Field supervisors should always check the labels on containers of new shipments to make sure that the strength of the herbicide corresponds with recommendations in field manuals on weight or volume to use. Further amounts of Ammate or 2,4-D on hand can be disposed of as follows: Use Ammate for spraying stream type ribes. The 2,4-D compounds can be used for spraying R. petiolare, otherwise, hold this chemical until results are known of combination spray tests on R. lacustre and R. viscosissimum.

Power spray. To each 100 gallons of water, add 120 fluid ounces of 2,4,5-T (3,000 p.p.m.), and 1 gallon of an emulsive oil.

Knapsack spray. To each gallon of water, add 1.2 fluid ounces (35 cc.) 2,4,5-T (3,000 p.p.m.), and 13 fluid ounces of an emulsive oil.

Hi-Fog gun.

Water spray. To 18 parts water, add 1 part 2,4,5-T and 1 part of an emulsive oil.

Oil spray. To 19 parts stove or fuel oil, add 1 part 2,4,5-T.

Decapitation. To 38 parts stove, fuel, or Diesel oil, add 5 parts 2,4,5-T.

LABORATORY, GREENHOUSE, AND SPECIAL ACTIVITIES

The following special activities have not been described elsewhere in this report and are listed here as a matter of record: (1) Seed germination tests, including effects of 2,4-D and 2,4,5-T on seeds of R. lacustre and R. roezli. (2) Testing of new organics furnished by Dr. Haller and by Dr. Roark (Division of Insecticide Investigations). (3) Greenhouse tests of 2,4,5-T and of special formulations of 2,4-D and 2,4,5-T with tributyl phosphate on ribes heretofore resistant to 2,4-D. (4) Improvement of techniques in preconditioning white pine seed for direct sowing, including testing of apparatus for cracking white pine seeds. (5) Design and construction of a rapid shut-off nozzle for use with high pressure spray units.

Several special reports on ribes ecology, disease survey methods, and results of chemical work were prepared for Blister Rust personnel. The following regular Serial Reports and publications are noted:

MS 9197:

Comparison of the Toxicity of 2,4-D and 2,4,5-T to Ribes.

. . . . H. R. Offord and V. D. Moss

Tests of the Helicopter Over Mountain Terrain for Spraying Woody Perennials.

. H. R. Offord

Fifth Annual North Central Weed Control Conference Research Report Dec. 8-10, 1948, Springfield, Ill.

Serial No. 142:

A list of Natural History Publications.

. C. R. Quick

W. G. Matthews, D. B. and D. B. Chittenden. Development of Forest Service policy for management of white pine under the influence of blister rust in the Idaho region. Technical report, Forest Service Region 1, Missoula, Mont., 1948. Also, with Matthews, specifications for sprayer unit complete. Western Forestry and Game Experiment Station, Region 1, Missoula, Mont., 1948.

W. G. Matthews and D. B. Chittenden. Blister rust control work in the Pacific Northwest. Report, Forest Service Region 1, Spokane, Wash., 1948.

OBJECTIVES AND METHODS OF THE COMBINED WHITE PINE STOCKING
AND BLISTER RUST LOSS SURVEY OF 1948

Working unit analyses^{1/} to determine the cost of blister rust control in terms of white pine production are to be completed early in 1949 for approximately 350 Forest Service white pine working units in the Inland Empire. Information on white pine stocking, mixed species stocking, and blister rust losses to white pine stocking used in the analyses is often scanty or outdated due to the lapse in survey work which occurred during the war. In order to obtain information necessary for adjusting completed analyses, and for working up new units, Mr. G. M. DeJarnette, in charge of blister rust control work for the Forest Service in Region 1, requested that this office design a combined survey to determine density of white pine stocking and losses to the white pine stocking due to blister rust. Fortunately, much of the essential data needed for the development of new disease survey methods had already been obtained^{2/} and it was possible to plan for the proposed increase in the scope of survey work.

At a joint Forest Service and Bureau of Entomology and Plant Quarantine survey conference it was agreed that the following information should be gathered by surveymen for use in unit area analyses: (1) per cent of the area stocked to white pine crop trees (usually dominant trees expected to remain in the stand and to contain merchantable timber at a rotation age of 120 years), (2) per cent of the area stocked to the various mixed species crop trees, (3) per cent of the area unstocked, (4) per cent of the white pine crop trees infected by blister rust, (5) per cent of the white pine crop tree stocked quadrats depopulated of all existing or potential white pine crop trees by blister rust (the loss expressed either as per cent of quadrats eventually reoccupied by the various mixed species crop trees or as per cent of quadrats reverting to an unstocked condition), (6) per cent of the white pine crop tree stocked quadrats also containing "reserve" white pines (potential crop trees which under existing rust conditions are not the sole white pine survivors within the quadrats), (7) years in which rust infection originated, and (8) quality of site or site index where necessary.

At the same meeting the quadrat size to be used in obtaining both stocking and rust information was established at 1/500 acre (9-1/3 x 9-1/3 feet). The numbers of evenly distributed white pine crop trees per acre necessary for full stocking in young stands had been approximated from a graph prepared by C. A. Wellner, Silviculturist, Northern Rocky Mountain Forest and Range Experiment Station. Using the Station's normal yield plot records, Wellner plotted the numbers of

^{1/} cf. Matthews, D. N. and S. B. Hutchison. Development of Forest Service policy for management of white pine under the handicap of blister rust in the Inland Empire. Typewritten rep., For Serv. Region 1, Missoula, Mont., 1948. Also, same authors, specifications for working unit analysis. Mimeo. instruction leaflet, For. Serv. Region 1, Missoula, Mont., 1948.

^{2/} cf. pp. 100-108 inc., Blister rust control work in the far west, 1947. Ann. rep., NW Region Office of Blister Rust Control, Spokane, Wash., 1948.

dominant and codominant pines per acre (essentially the number of crop trees per acre) over age of stand. The resulting curve showed that approximately 500, 400, 350, 300, 275, and 250 evenly distributed crop trees per acre were required for full stocking in the 0-10, 11-20, 21-30, 31-40, 41-50, and 51-60 year age classes, respectively. Theoretically, the correct quadrat sizes to use while surveying in these age classes would then be 1/500, 1/400, 1/350, 1/300, 1/275, or 1/250 acre, respectively (quadrats 9.33, 10.44, 11.16, 12.05, 12.59, and 13.20 feet on a side, respectively). Thus the percentages of stocking obtained using the 1/500 acre quadrat are correct only when surveying in a 0-10 year old stand. It was reasoned, however, that rather than to change the quadrat size for each age class encountered in the field, it would be simplest to use the single (1/500 acre) size quadrat. Results of the stocking survey could then be corrected by multiplying the raw data percentages by a factor determined from the difference in area between the 1/500 acre and the larger quadrats. For example, results obtained using the 1/500 acre quadrat for surveying in 51-60 year old stands would be multiplied by a "mark-up factor" of 2.00; the 1/500 acre quadrat containing only half the area of the 1/250 acre quadrat presumably of the correct size for survey in 51-60 year old stands.

Other simplified methods which might be used to circumvent the need for frequently changing quadrat size were discussed. Among these, a system employing two quadrat sizes, i.e., 1/500 acre for age classes up to 20 years and 1/250 acre for age classes from 21-60 years, seemed to have some merit in that the artificial and possibly erroneous procedure of marking-up results could be avoided. Subsequently checks were made to determine whether marked-up results from a 1/500 acre quadrat survey differed from those of the 1/250 acre quadrat, when dealing with older stands. Four differently composed 30- to 60-year-old white pine stands were surveyed using rows of the smaller quadrats superimposed on rows of the larger. Results of this work showed that there was a small but significant difference between means for per cent of the area stocked with white pine crop trees (6.4 per cent), in favor of the larger quadrat. It is unlikely that this difference would have any great influence in changing area classifications or working unit priorities. It later developed during training of surveymen and application of the survey in the field that the single size of quadrat was by far the most easily understood and applied. It was necessary for surveymen to become familiar with judging stocking in only one size of quadrat and to carry only one size of quadrat measuring pole.

At the survey conference it was also pointed out that the work of obtaining the required information on rust losses would be slow and expensive due to the fact that many of the stands requiring attention were of pole size. This made the use of tree climbers necessary. In view of the large number of working units to be covered, it was felt that a sampling method would have to be devised which would reduce the time and cost of examining pole stands to a minimum consistent with the accuracy of results desired. Design of the survey, detailed instruction of survey supervisory personnel, and training of a nucleus of surveymen were turned over to R. T. Bingham of the Bureau of Entomology and Plant Quarantine. Recruiting of forestry school students was handled jointly by the Forest Service and the Bureau.

A training school for surveymen was established on the St. Joe National Forest near Emida, Idaho. Training in the prediction of eventual dominance of individual

trees, or in the designation of crop trees, was given first. This consisted of giving surveymen a basic understanding of the relative competitive ability of the various coniferous tree species of the region as determined by their tolerance, expected height growth rates, ability to attain dominance under varying degrees of stand density, ability to grow on sites of differing exposure and quality, and reaction to direct association with other species. Following this training applicable to judging future crop trees in young stands, the men examined older pole stands to substantiate the information they had been given. In moderately dense to dense pole stands, the identity of the tree which will eventually become dominant in any particular quadrat is usually clearly foreshadowed by the already pronounced dominance of one of the trees within the quadrat boundaries. Increment borings or annual branch whorl counts made on such dominant trees and on their suppressed neighbors were then studied. These helped to determine the relative heights and crown canopy positions occupied by the various trees under consideration at an earlier date, when dominance of individual trees was not yet pronounced. Thus, knowing the relative height, position in the crown canopy in relation to associated trees, and position of the tree bole on the ground in relation to those of associated trees for the "young" trees which later became dominant, it was possible for surveymen to formulate rules of thumb regarding the future aggressiveness of young trees of any of the species studied. For example, in the vicinity of the study area, a white pine tree in competition with a western larch in the same quadrat was considered to be the crop tree when overtopped by the larch only if the pine was not more than 10 feet shorter than the larch; if it was not less than 4 to 6 feet from the base of the larch, and if it was above other coniferous trees in the immediate vicinity on at least two sides (open for at least 180° of angle). Despite earlier establishment of the light-seeded larch and its rapid early growth rate, results of more than a hundred borings showed white pines like those described above had become dominant over larches. This was apparently due to greater tolerance of the white pine, deceleration of larch height growth rate at the young pole age, and acceleration of white pine height growth rate after about the first 10 years.

Survey supervisors were given special instruction in the use of the increment borer for reading back pole stands. This enabled them to reinvestigate the questions of future dominance so that they were able to adjust judgments of field personnel in conformance with conditions on the particular area to be surveyed.

Sample rows of staked and strung 1/500 acre quadrats were then examined to acquaint surveymen with the size of the quadrat they would use. Practice judgments as to the tree most likely to become the future crop trees on these quadrats were then made by each surveyman and discussed in detail by the group.

Also of importance was exercise in judging the potentialities of individual blister rust branch cankers for eventually killing the trees. Information used in making these judgments was obtained from the University of Idaho blister rust study, wherein almost 1,350 artificially inoculated cankers have been thrice-annually measured during the last 5 to 9 years.

Detailed records on rate of canker growth toward trunk, on canker growth in relation to branch nodes crossed by the advancing canker, on time of canker

induced branch flagging, on relative vigor of cankered branches, and on presence and position of live lateral branches between the canker margin and trunk, make the data the best now available in this region.

Study cankers unaffected by the presence of other cankers nearer to trunk on the same branches number 483. These may be segregated into five classes as follows: (1) 106 dead cankers on branches which had been vigorous prior to canker induced flagging, (2) 46 dead cankers on branches which had been suppressed through natural stand closure, (3) 268 living branch cankers which have not yet reached trunk, (4) 49 living branch cankers which have reached trunk only recently so that their growth had been measured principally on the branches, and (5) 14 cankers which originated on trunk or had been in trunk long enough so that their growth had been measured principally on the trunks. Tabulation of the five classes of cankers outlined above by one-fourth inch branch or trunk diameter classes brought out several important facts in relation to the growth potential of the average threatening canker: (1) It was noted that cankers on the larger diameter branches were capable of crossing longer unsupported branch internodes than were those on the smaller diameter branches. (2) The length of unsupported internode crossed by the average dead canker was for practical purposes the same whether the cankers had formerly lived on vigorous or suppressed branches. (3) Cankers which had remained alive but had not yet reached trunk had advanced toward trunk across relatively short unsupported internodes; those which had died prior to reaching trunk had failed to cross relatively long unsupported internodes. (4) Cankers which had reached trunk had advanced toward trunk across relatively shorter unsupported internodes than had living cankers which had not yet reached trunk. Accordingly, the diameter of the cankered branch, and the length of the longest unsupported internode (unneeded portion of branch intervening between branch whorls having live lateral branches) occurring between the canker and trunk, are considered the most important factors limiting canker growth.

Using the averages of measurements on cankered branch diameters and on unsupported internodal lengths over which cankers had spread, it was possible to set up a simplified field procedure for judging the average growth potential of individual branch cankers. Any canker within 24 inches of trunk was considered to be a threat to the supporting crop tree. They were given further detailed examination. Cankers on branches up to $\frac{1}{2}$ inch in diameter were considered incapable of spreading over 6 inches between sources of food in the form of green lateral branches; those on branches larger than $\frac{1}{2}$ inch up to 1 inch, 9 inches; and those on branches larger than 1 inch, 12 inches. This procedure was not particularly time-consuming in the field since surveymen took time only to detect and examine threatening cankers, then made ocular estimates to determine whether the cankers were dangerous according to the criteria just outlined.

Following the completion of basic training, the 24 men attending survey school were given instruction in the use of field data forms and in field work during the survey of a section of land adjacent to the training area. The results of this survey were then used to determine the sampling intensity necessary to yield results of the desired accuracy in the practical field surveys to follow.

Preliminary investigations had led to the belief that lines composed of rows of contiguous quadrats and laid across both major and minor drainages at about 10-chain intervals were likely to give sample means for stocking density and rust

loss sufficiently accurate for our needs. It remained, however, to determine whether or not the expensive work of sampling for rust loss in pole stands could be reduced by examining fewer quadrats for rust loss than for stocking. The problem was solved in the following manner: Sample means for rust loss were first determined by examining all quadrats on the survey lines. These means were then compared with sample means calculated by manipulation of the original field data sheets so that the number of quadrats composing the sample was systematically reduced to approximately 1/5 or 1/10 of the original number. It was found that a rust loss sample involving only 10 per cent of original number of quadrats, consequently only one-tenth as much work and cost, gave a mean percentage for rust loss (19.1) varying from the mean percentage of loss as calculated from all original quadrats (20.7) by less than 2 per cent. Standard error of the means was 2.8 and 3.5 per cent, or 13.5 and 18.3 per cent of the means, respectively. Accordingly, survey parties were instructed to sample all quadrats on the sample lines for stocking but to sample for rust loss only the first quadrat occupied by a white pine crop tree in each 10-quadrat transect along the survey lines. Later analyses proved that field data provided sample means generally accurate within 20 per cent of the means in two out of three cases. This included areas where the sampling intensity was reduced by increasing the interval between sample lines to 20 or 40 chains, or where rust samples were taken only on alternate lines spaced at 20-chain interval.

The intensive training of 6 supervisory personnel and 18 crewmen, a nucleus around which larger parties were later built up in the field, was completed by mid-June. In August, a crew of over 50 overhead and men was trained and employed at least part time on the survey job. Work was continued into October, keeping the survey force at about half strength with the use of blister rust unit supervisors, camp foremen, and checkers after the blister rust camps had closed down. Most of the areas needing attention within questionable or nonsurveyed working units were covered this season with the force described above. Variations from the original survey specifications were necessary in order to complete as much of the work as possible during the season. Over 100 working units and areas within working units were examined. Methods and results have been found to be generally consistent among the six different survey parties on the national forests concerned.

Valuable assistance in advance planning of survey techniques, in recruiting surveymen, and in planning and checking sampling procedures was rendered by C. A. Wellner, A. W. Slipp, D. N. Matthews, R. A. Chapman, and C. R. Stillinger. Assistance in the establishment of the survey school and in the training of surveymen was rendered by C. M. Miller, D. J. Moore, E. W. Smith III, H. J. Hartman, W. F. Painter, R. L. Hilding, D. Snyder, K. C. McCracken, and D. Weistaner. R. T. Bingham was in charge of survey planning and training and remained in an advisory capacity throughout the season. F. J. Heinrich was assigned in charge of field survey work on July 1, 1948, and served in this capacity assisted by Bingham until November 1, 1948.

PHOTOGRAPHIC AND EDUCATIONAL WORK, 1948

By

Frank O. Walters, Assistant Regional Leader

H. Miller Cowling, Photographic Specialist

Photographic Section

In addition to the normal work schedule, the photographer was called upon to take 31 reshoots of scenes for the western blister rust motion picture. For the Department of Agriculture Year Book, pictures of nine specific situations relative to the disease were taken in both color and black and white.

Widespread interest has been displayed in the Elk River pine regeneration picture series, and numerous requests have been received for prints. Mr. Chapin Collins of the American Forest Product Industries has submitted the series to Life magazine.

The Spokane Chamber of Commerce was supplied with 22 pictures of various phases of blister rust control activities.

PHOTOGRAPHIC, MULTILITH, BLACKLINE, AND MIMEOGRAPH WORK

Item	North- western Region	Pacific Coast Region	Pear Psylla Control*	Total
PHOTOGRAPHIC				
Lantern slides, natural color	48			48
Films developed, field films	176			176
roll film	5			5
packs			1	1
Copies, 5x7			13	13
8x10	295	63	2	360
Printing, 4x5 or smaller	42			42
5x7	1,408			1,408
8x10	18			18
9x11	1,316	110	488	1,914
on film	39	12		51
Enlarging, 5x7	4	81		85
9x12		13		13
22x28	261			261
Total Items	3,612	279	504	4,395
MULTILITH				
Duplimats made	128			128
Plates made	47			47
Cards printed	800			800
Cards printed, reverse	800			800
Total Cards	1,600			1,600
Paper printed	45,825	40,500		86,325
Paper printed, reverse	12,800	29,500		42,300
Total Paper	58,625	70,000		128,625
Total Items	60,400	70,000		130,400
BLACKLINE PRINTER				
Total Maps Printed	2,107			2,107
MIMEOGRAPH				
Total Paper	4,415			4,415
Grand Total All Items	70,534	70,279	504	141,317

*No work after February 1.

Educational Section

The Timber Products Bureau of the Spokane Chamber of Commerce made a 3-day trip through the Clearwater area. In the course of the trip, they were shown excellent white pine reproduction occurring on protected lands and conditions prevailing where no control had been accomplished. They gained some idea of the relationship of logging practices to blister rust control. Through the use of our training charts, they were able to get a comprehensive idea of the disease cycle and economic factors involved. This was a material help to them in interpreting what they saw.

The State of Idaho Land Board made their annual trip through the Clearwater and Potlatch Timber Protective Associations. Members of the board had previously been so impressed with the excellent reproduction in protected areas in the vicinity of Hollywood that they insisted the members of the board who had not made the trip the previous year see the area. Showing of the film, "Enemy of Pines," added a wider understanding to the board members' knowledge of the disease and the program of control.

Requests have come in from college students in various parts of the country who have worked on blister rust, for detailed information on all phases of the disease and its control for the purpose of preparing term papers. Such widespread interest is apparently the result of a better job in presenting the disease and the control program to workers.

Talks, Slides, Displays, and Motion Pictures.

Showing of blister rust films was not pushed as the old film has had wide distribution and the new film was not yet available. In all, 13 showings were made to 480 persons.

Three panels of pictures showing various phases of the disease, together with control and scenic pictures, were prepared. These were used as an educational feature at the large Boy Scout summer camp on Diamond Lake.

Additional displays will be prepared for use in store windows next season.

ORGANIZATION OF THE NORTHWESTERN REGIONAL OFFICE - 1948

1. Regional Leader in Charge, H. E. Swanson, Pathologist
2. Assistant Regional Leader, F. O. Walters, Pathologist
3. Cooperative Local Control:
 - a. Clearwater Operation, Idaho:
Operation Supervisor, M. C. Riley, Forester
Assistant Operation Supervisor, H. J. Faulkner, Forester
 - b. St. Joe Operation, Idaho:
Operation Supervisor, H. J. Hartman, Forester
Assistant Operation Supervisor, W. F. Painter, Pathologist
Unit Supervisor, R. H. Kliever, Agent (Resigned 6/1/48)
Unit Supervisor, Donald F. Williams, Agent (5/24/48)
Special Duty Assistant, R. E. Myers, Agent
 - c. Coeur d'Alene Operation, Idaho:
Operation Supervisor, A. L. Pence, Jr., Forester (Resigned 11/3/48)
Operation Supervisor, F. J. Heinrich, Pathologist
 - d. Kaniksu Operation, Idaho-Washington:
Operation Supervisor, H. A. Brischle, Pathologist
Assistant Operation Supervisor, S. S. Evans, Agent
Unit Supervisor, L. J. Easley, Agent
 - e. Montana Operation:
Operation Supervisor, A. S. Skoglund, Pathologist
 - f. National Parks, Washington-Montana-Wyoming:
Operation Supervisor, J. C. Gynn, Pathologist
Assistant Operation Supervisor, C. M. Chapman, Pathologist
4. Projects:
 - a. Education and Information:
H. M. Cowling, Photographic Specialist
J. C. Gonyou, Draftsman
 - b. Methods Development and Control Investigation (BLR 1-6):
V. D. Moss, Forest Ecologist
J. F. Breakey, Pathologist
C. R. Stillinger, Pathologist
R. T. Bingham, Agent
(Personnel assigned to Northwestern Region by H. R. Offord)
5. Business Administration and Clerical:
 - a. E. G. Schmidt, Administrative Assistant (Transferred 10/4/48)
S. J. Dorick, Administrative Assistant (10/4/48)
E. K. LaPrey, Storekeeper
L. C. Miller, Automobile Mechanic
 - b. M. L. McWold, Administrative Assistant, Fiscal
M. C. Yourt, Clerk
 - c. M. Wilson, Clerk (Resigned 10/1/48)
M. P. Kirsten, Clerk
A. B. Treffry, Clerk-Stenographer
M. I. Williams, Clerk-Stenographer
J. L. Radkey, Clerk-Typist
 - d. L. E. Klatt, Administrative Assistant, Personnel
E. E. Smith, Clerk-Stenographer

APPROPRIATIONS
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
NORTHWESTERN REGION OF BLISTER RUST CONTROL

Regular Appropriations

Fiscal Year 1948:

Project 3101.14 NW (Administrative)	\$128,000.00	
Project 3103.14 NW (Cooperative)	<u>125,000.00</u>	
		\$251,000.00

Fiscal Year 1949 (as of 12/31/48):

Project 71.14 NW (Administrative)	\$128,000.00	
Project 73.14 NW (Cooperative)	<u>125,000.00</u>	
		\$251,000.00

Contributed Funds (deposited with U. S. Treasury)

State of Idaho		\$ 20,000.00	
Clearwater Timber Protective Association	\$6,502.78		
Potlatch Timber Protective Association	5,396.16		
Priest Lake Timber Protective Association	<u>4,055.00</u>	<u>15,953.94</u>	
			\$ 35,953.94

TABLE 1

FEDERAL EXPENDITURES, NORTHWESTERN REGION OF BLISTER RUST CONTROL
CALENDAR YEAR 1948, REGULAR APPROPRIATIONS

Project		Salaries	Expense	Total
January 1 to June 30, 1948				
I	Planning, Coordination, Technical Direction			
1.1	- Clearwater Operation, Idaho	\$ 5,922.92	\$ 4,982.84	\$10,905.76
1.2	- St. Joe Operation, Idaho	8,370.57	2,848.29	11,218.86
1.3	- Coeur d'Alene Operation, Idaho	2,439.97	41.26	2,481.23
1.4	- Kaniksu Operation, Idaho	8,348.87	3,545.58	11,894.45
1.6C	- Cabinet Operation, Montana	1,189.62	111.28	1,300.90
1.6K	- Kootenai Operation, Montana	1,189.62	111.28	1,300.90
1.7	- National Parks	4,315.70	306.42	4,622.12
1.A	- Office Maintenance	16,664.02	4,418.09	21,082.11
1.B	- Supervision	6,274.68	586.75	6,861.43
1.C	- Education and Information	2,146.85	529.75	2,676.60
1.D	- Control Investigations		5.55	5.55
1.E	- Methods Development	23.52	68.99	92.51
Total, Project I, Jan. 1-June 30, 1948		\$56,886.34	\$17,556.08	\$74,442.42
III	Cooperative Ribes Eradication on State and Private Lands			
3.1	- Clearwater Operation, Idaho	\$ 2,953.45	\$ 25.95	\$ 2,979.40
3.2	- St. Joe Operation, Idaho	5,606.92	-6.25	5,600.67
3.4	- Kaniksu Operation, Idaho	4,904.98	1,390.28	6,295.26
Total, Project III, Jan. 1-June 30, 1948		\$13,465.35	\$ 1,409.98	\$14,875.33
July 1 to December 31, 1948				
I	1.1 - Clearwater Operation, Idaho	\$ 5,059.30*	\$ 1,161.64	\$ 6,220.94
	1.2 - St. Joe Operation, Idaho	6,700.22*	1,578.03	8,278.25
	1.3 - Coeur d'Alene Operation, Idaho	687.87*	148.29	836.16
	1.4 - Kaniksu Operation, Idaho	4,566.39*	1,103.23	5,669.67
	1.6C - Cabinet Operation, Montana	644.58*	149.34	793.92
	1.6K - Kootenai Operation, Montana	644.58*	149.34	793.92
	1.7 - National Parks	4,480.83	897.20	5,378.03
	1.A - Office Maintenance	17,261.31	5,331.99	22,593.30
	1.B - Supervision	6,402.20	577.50	6,979.70
	1.C - Education and Information	2,179.20	289.01	2,468.21
	1.D - Control Investigations	131.98*	195.50	327.48
	1.E - Methods Development	146.52	121.57	268.09
Total, Project I, July 1-Dec. 31, 1948		\$48,904.98	\$11,702.69	\$60,607.67
III	3.1 - Clearwater Operation, Idaho	\$20,584.24	\$ 3,348.89	\$23,933.13
	3.2 - St. Joe Operation, Idaho	28,206.92	1,430.79	29,637.71
	3.4 - Kaniksu Operation, Idaho	27,219.01	3,673.82	30,892.83
Total, Project III, July 1-Dec. 31, 1948		\$76,010.17	\$ 8,453.50	\$84,463.67

*Salaries of operation supervisors or assistants repaid to our appropriation by Forest Service, not included in these totals.

TABLE 2

SUMMARY OF EXPENDITURES FROM STATE AND
PRIVATE FUNDS, 1928 - 1948, IDAHO

Year	State	T.P.A.	Total
1928	\$ 2,518.55	\$ 2,264.32	\$ 4,782.87
1929		19,027.66	19,027.66
1930		20,000.00	20,000.00
1931	5,000.00	35,905.32	40,905.32
1932	8,003.43	11,186.33	19,189.76
1933			
1934	29,154.06		29,154.06
1935	15,000.00		15,000.00
1936	16,998.25		16,998.25
1937	15,001.25		15,001.25
1938	15,000.44		15,000.44
1939	15,438.04		15,438.04
1940	10,034.48		10,034.48
1941	7,542.73	15,756.40	23,299.13
1942	22,761.68	15,440.78	38,202.46
1943	12,252.13	336.68	12,638.81
1944	12,506.60	15,612.98	28,119.58
1945	6,287.68	5,111.03	11,398.71
1946	14,943.35	26,651.65	41,595.00
1947	15,028.11	15,909.24	30,937.35
1948	20,025.00	15,953.94	35,978.94
Total	\$243,495.78	\$199,206.33	\$442,702.11